

Appendix C



Nulhegan Basin Division

Land Protection Plan

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I. Introduction

Overview

This draft Land Protection Plan (LPP) provides detailed information regarding a proposal by the United States (U.S.) Fish and Wildlife Service (Service; we, our) to expand land protection authority within the legislative boundary of the Silvio O. Conte National Fish and Wildlife Refuge (Conte Refuge; refuge). The legislative boundary of the refuge encompasses the entire Connecticut River Watershed (watershed) including land in Connecticut, Massachusetts, New Hampshire, and Vermont (map C.1). Current refuge-owned lands include 35,921 acres as of October 2013¹. There are nine established divisions and eight units depicted on map C.1. Divisions are larger and consist of many individual acquired parcels; units are smaller and typically include only one or two acquired parcels.

Our proposal is to expand our authority to protect land for Conte Refuge's from approximately 97,830 acres (current authority) up to approximately 197,296 acres total. This represents an expansion of approximately 99,466 acres. Over the duration of this project, we propose that approximately 65 percent (128,242 acres) of the entire 197,296-acre project area be acquired by the Service in fee title from willing sellers. The remaining 35 percent (69,054 acres) would involve less than fee title acquisition, such as conservation easements. However, the actual split between fee and easement will be heavily influenced by the preferences of the landowners. This proposal to expand the refuge is part of the Service-preferred alternative (alternative C) in the draft comprehensive conservation plan and environmental impact statement (CCP/EIS) for Conte Refuge. This LPP is included in the draft CCP/EIS as appendix. The Service's Director will make a decision to approve or disapprove this administrative increase in acquisition authority based on the information in this plan.

The overarching goal of this LPP is to permanently protect areas of significance to Federal trust resources while also working with our partners to ensure that diversity and connectivity in area (size), latitude, elevation, aspect, process, and landform is represented and appropriately connected in the conserved lands network in the watershed. Collaborating with our partners to achieve such a network will sustain representation, redundancy, and resiliency of species, habitats, and ecosystems within the watershed, and thereby promote a landscape that can better adapt and remain viable despite anticipated future climate and land use changes.

In this document, we incorporate the information required by Service policy for a refuge expansion proposal, as well as additional information on how the proposal meets other Service initiatives and directives. Specifically, we detail how the project proposal:

- Adheres to all four principles of Strategic Habitat Conservation (SHC) (<http://www.fws.gov/landscape-conservation/shc.html>; accessed April 2015).
- Benefits the conservation targets identified in the Service's Strategic Growth Policy for the National Wildlife Refuge System (Refuge System); specifically, federally listed threatened and endangered species, migratory birds, and waterfowl (<http://www.fws.gov/policy/602fw5.html>; accessed January 2015).
- Supports the Connecticut River Watershed Landscape Conservation Design pilot project (Connecticut River Watershed LCD); a collaborative project involving over 30 conservation partners in the watershed to identify strategic areas for conserving wildlife and habitats (<http://northatlanticlcc.org/groups/connecticut-river-watershed-pilot>; accessed January 2015).
- Uses representative (e.g. also referred to as "surrogate") species to identify specific contributions to conserving other important habitat and species of conservation concern in the watershed (<http://www.fws.gov/landscape-conservation/selecting-species.html>; March 2015).
- Addresses anticipated climate change and land use impacts and supports the Services' strategic plan for addressing climate change using adaptation, mitigation, and engagement strategies (<http://www.fws.gov/home/climatechange/strategy.html>; accessed March 2015).

¹ Due to the refuge's active acquisition program, it has been challenging to continuously update the maps and analysis in the draft CCP/EIS. 2014 acquisitions include a new division in New Hampshire (Mascoma River Division) and two new units in Massachusetts (Fannie Stebbins Unit and Hatfield Unit).

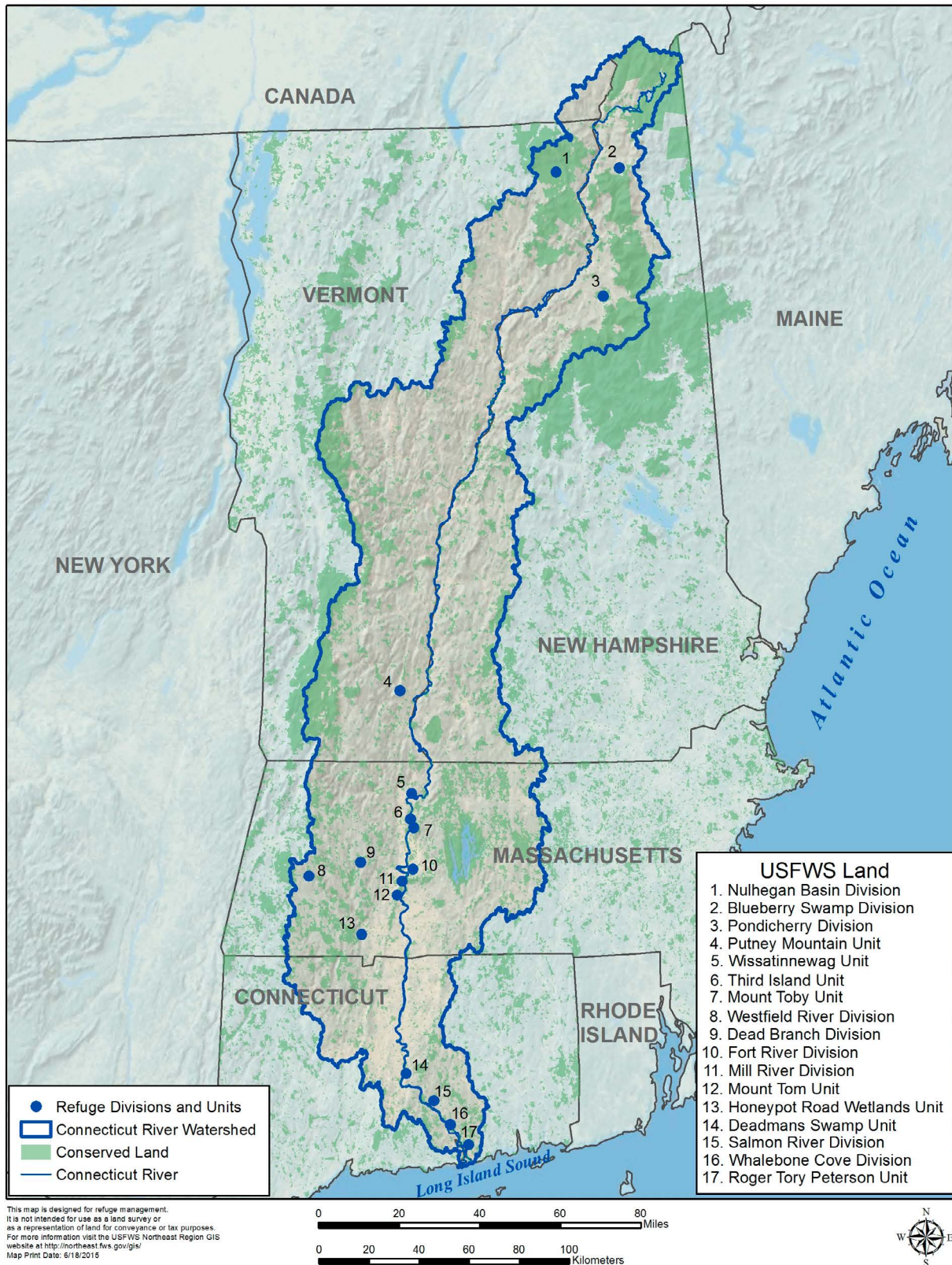
Map C.1. Existing Refuge Lands and Other Conserved Lands in the Connecticut River Watershed (as of October 2013)



U.S. Fish & Wildlife Service

Location of Existing Refuge Divisions and Units

Silvio O. Conte National Fish and Wildlife Refuge



- Supports the Service's Urban Refuge Initiative (<http://www.fws.gov/urban/index.php>; accessed January 2015).
- Complements and reinforces conservation partners' land protection actions and conservation priorities in the watershed; including supporting State Wildlife Action Plans (State WAPs).
- Helps meet public interest in increasing compatible, wildlife-dependent recreational and educational opportunities in the hundreds of communities in the watershed.

General Description of the Connecticut River Watershed

The watershed is a microcosm of the Northeast Region. It is home to about 2.4 million people in 396 communities spanning rural, sparsely populated areas in the north, to more developed areas in the south. Map C.2 depicts urban areas in the watershed. The area has a rich cultural history, steeped in traditions of a working landscape based on forestry, agriculture, and the manufacturing industry.

As the Connecticut River (river) traverses its 410-mile length from the Canadian border to Long Island Sound, the river encounters dramatic changes in elevation, gradient, and vegetation. The watershed rises from sea level where the river meets the Long Island Sound to the highest alpine elevation in New England. The river predominantly travels from north to south, dropping about 2,600 feet in elevation along its length. Near its origins in the Northeast Kingdom of Vermont, the Connecticut Lakes area of New Hampshire, and Canada, the watershed includes mountains with elevations exceeding 3,000 feet. In these northern environs, the river is a narrow, swift, cold water stream that falls some 900 feet in 30 miles, the sharpest drop within its profile. At its confluence with Long Island Sound, the river's tidal influences provides habitat for a completely different complement of flora and fauna. Here, the river offers significant opportunities within the refuge boundary to prepare for sea level rise, allowing for climate change adaptation; namely, the landward migration of tidal (salt, brackish, and fresh) wetlands and other coastal habitats.

The watershed is approximately 80 percent forested, 12 percent agricultural, 3 percent developed, 3 percent wetland, and 2 percent water. Diverse habitats in the watershed include:

- Floodplain forests and other riparian habitats valuable to migrating songbirds, waterfowl, and many other species of plants and animals.
- Sandplains, old field grasslands, shrublands, and agricultural fields valuable to grassland-nesting birds and other early successional species of conservation concern.
- A variety of forest types, including large areas of relatively unfragmented northern hardwood and conifer forest types, valuable to nesting migrant birds and many other plant and animal species.
- Riverine habitats valuable to migratory fish, other native resident fish, freshwater mussels, and other aquatic species.
- Internationally important (e.g. Ramsar-designated) tidal wetlands.

The most common forests are hardwood dominant maple-beech-birch to the north and oak-hickory to the south, with a transitional forest consisting of a blend of the two types found in between. These forests often cloak the gently sloping rich organic soils along hills and mid-elevation ranges of mountain sides. Softwood dominant forests generally occur in high elevations, low wet depressions, and well-drained sandy soils with spruce-fir abundant in the north and eastern hemlock, and red and white pine more common to the south.

The watershed contains a diverse mix of wetlands. Conifer wetlands and bogs are most common in the north. Beaver flowages are the most widespread wetlands, occurring throughout the watershed. Dams and other river barriers interrupt natural flow regimes, creating impounded aquatic habitats in once free flowing rivers and fragmenting access to fish spawning grounds that once extended to tributaries throughout the watershed. However, there are no barriers to aquatic species passage and migration until Holyoke, Massachusetts, which is well above the head of tide in the vicinity of Hartford, Connecticut.

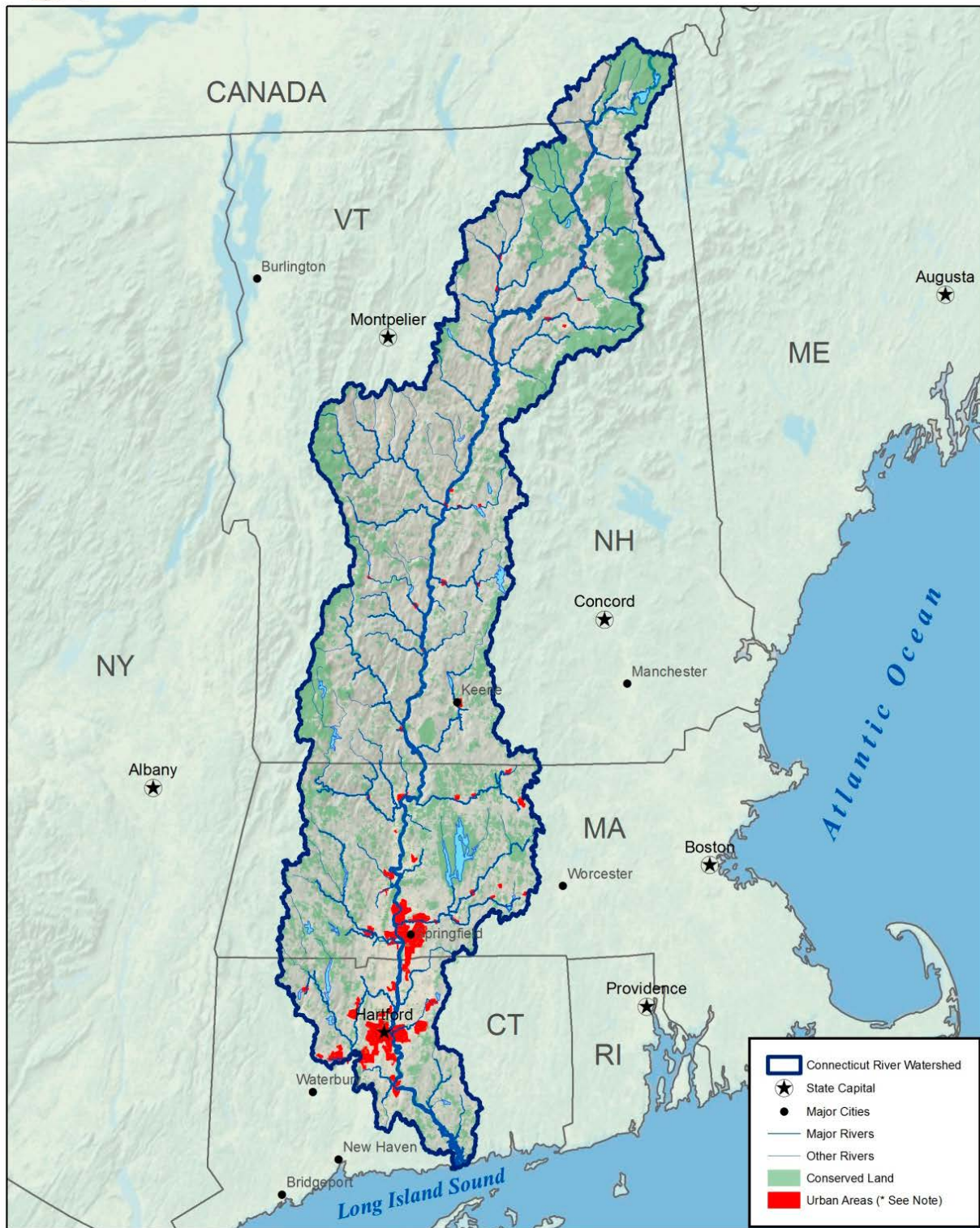
Map C.2. Urban Areas in the Connecticut River Watershed



U.S. Fish & Wildlife Service

Connecticut River Watershed

Silvio O. Conte National Fish and Wildlife Refuge



This map is not intended for use as a land survey or as a representation of land for conveyance or tax purposes. The conserved lands layer (2012) was obtained from Trust for Public Land. Other base layers were obtained from ESRI. For more information visit the USFWS Northeast Region GIS website at <http://northeast.fws.gov/gis/>. Map Print Date: 3/23/2015

0 20 40 60 80 Miles
0 30 60 90 120 Kilometers

Note: "The depiction on the map is based on U.S. Census Bureau definitions for: 'urbanized areas' = 50,000 or more people; and, 'urban clusters' = at least 2,500 and less than 50,000 people."

Historically, shrubs and grasslands were abundant, but have diminished substantially following the abandonment of farms during the 20th century. Today, open habitats are typically associated with old beaver flowages, hay fields, pasture, croplands, and other agricultural enterprises.

Urbanization in the watershed has been most pronounced in Massachusetts and Connecticut, although communities dot the river along its entire course. Approximately 3 percent of the watershed has been developed for residential, municipal, commercial, or other purposes.

The watershed supports a rich array of wildlife. Fifty-nine species of mammals live within the watershed year-round, including the federally listed lynx and northern long eared bat, as well as bobcat, black bear, white-tailed deer, moose, coyote, fisher, other forest bats, rabbits and hare, and a variety of other small mammals. Twenty-seven species of ducks, geese, and swans, 15 species of shorebirds, and 24 other water-dependent bird species such as rails, grebes, and herons, use the watershed for breeding, wintering, or migration. The watershed is also host to 181 passerine and raptor species. Of these, 88 are neotropical migrants using the watershed for breeding; 77 are residents breeding and wintering, and 16 are winter residents that migrate to the watershed from the north. Reptiles include 9 species of turtles and 16 snakes. Amphibians include 12 species of salamander, and 7 species of toads and frogs.

The watershed also supports a wide diversity of fish species. Included are 33 native or indigenous freshwater species; 35 nonindigenous freshwater fish; 11 anadromous fish; 1 catadromous fish; 15 amphidromous fish; and 48 saltwater fish. The northern reaches of the river, in the Connecticut Lakes region, provide habitat for lake and brook trout and land-locked salmon. American shad have impressive runs in the river, as do sea lamprey and American eel. Shortnose sturgeon, a federally listed species, occurs up to the Turner's Falls Dam in Massachusetts. Striped bass are in abundance below the Holyoke Dam, but are also known to pass upstream of Vernon Dam in much smaller numbers. The mid-section of the river also supports pickerel, largemouth and smallmouth bass, northern and walleye pike, and a variety of panfish. Summer flounder are found at the mouth of the river. Carp, suckers, and catfish are also present in many areas.

Conte Refuge Establishment History

The refuge was named in honor of the late U.S. Congressman Silvio O. Conte of Massachusetts, who dreamed of conserving the watershed, in part, by creating a new national wildlife refuge. He also envisioned Federal, State, and non-governmental conservation organizations working collaboratively to protect threatened and endangered species and conserve the rich diversity of fish, wildlife, and plants throughout the watershed. He was a strong advocate of using sound science to inform and promote conservation action, while also supporting environmental education, outdoor recreation, and traditional natural resource-based economic endeavors within this large and integrated working landscape.

Congress passed the Silvio O. Conte National Fish and Wildlife Refuge Act (Conte Refuge Act) in 1991 to initiate making Congressman Conte's dream a reality. Reflecting his foresight and vision, the Conte Refuge Act emphasizes collaborative, landscape-scale conservation within the watershed, as well as developing science centers, and promoting environmental education, outdoor recreation, forestry, and farming.

The Conte Refuge Act legislated a refuge boundary that encompasses the entire 7.2 million-acre watershed, spanning the entire length of the 410-mile river (map C.1). Conte Refuge was authorized by a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) produced by the Service in 1995. The refuge was established on October 3, 1997 through a donation to the Service of the 3.8-acre Third Island, located in Deerfield, Massachusetts, by the Connecticut River Watershed Council. The 1995 FEIS/ROD, and subsequent National Environmental Policy Act (NEPA) compliant amendments to the refuge acquisition program, authorized acquisition of 97,830 acres allocated within 65 Special Focus Areas (SFAs) distributed throughout the watershed. As of October 2013, approximately 35,921² of those acres are under Service stewardship and managed as part of the refuge and the larger conservation lands mosaic (map C.1). In total, just over 1.8 million acres within the watershed is in some form of conservation (map C.1).

Refuge Purposes, Mission, Vision, and Goals

The refuge purposes were legislatively mandated. The refuge mission and vision statements, and the refuge goals, were developed as part of the draft CCP/EIS planning process. The refuge purposes, mission, vision, and goals are presented below.

² As of this May 2015 publication date, Conte Refuge has grown to 36,942 acres. This number will continue to grow because the refuge is a land protection priority for the Northeast Region.

Legislated Purposes

The Conte Refuge Act of 1991 (Public Law 102-212) authorizes the following refuge purposes:

- Conserve, protect, and enhance the Connecticut River Watershed populations of Atlantic salmon, American shad, river herring, shortnose sturgeon, bald eagles, peregrine falcons, osprey, black ducks, and other native species of plants, fish, and wildlife.
- Protect species listed as endangered or threatened, or identified as candidates for listing, pursuant to the Endangered Species Act of 1973, as amended.
- Conserve, protect, and enhance the natural diversity and abundance of plant, fish, and wildlife species and the ecosystems upon which these species depend within the refuge.
- Restore and maintain the chemical, physical, and biological integrity of wetlands and other waters within the refuge.
- Fulfill the international treaty obligations of the U.S. relating to fish and wildlife and wetlands.
- Provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access to the extent compatible with the other refuge purposes.

Mission Statement

“Work in partnership with others to inspire stewardship, magnify achievements, and celebrate shared successes that enhance, nurture, and voluntarily and collaboratively protect the natural, cultural, and sustainable economic richness of the Connecticut River and its watershed as a New England working landscape composed of public and private land.”

Vision Statement

“The Connecticut River is treasured by all for its majesty and significance in supporting life along its winding 410-mile passage through urban and rural communities in New Hampshire, Vermont, Massachusetts, and Connecticut. Working with our partners, we are inspired to protect and enhance the natural and cultural richness throughout the watershed, especially on lands and waters entrusted to our agency as the Silvio O. Conte National Fish and Wildlife Refuge.

Together with our partners, we design, support, and implement strategic conservation actions across the watershed, and communicate conservation needs and successes through extensive outreach and education programs. On refuge lands, we offer visitor programs and activities that promote an appreciation of the Connecticut River Watershed as an intact, interconnected, and healthy ecosystem. Visitors respond to this greater awareness by becoming active stewards of the watershed’s natural and cultural resources. Our actions exemplify the Service’s vital role in conserving the Connecticut River Watershed and the refuge’s important contribution to the mission of the National Wildlife Refuge System.”

Refuge Goals

Four refuge goals were collaboratively developed with partners during the CCP planning process to help achieve the vision, mission, and legislated purposes for the refuge:

Habitat and Species Conservation

- Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River Watershed in an amount and distribution that sustains ecological function, supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Education, Outreach, and Interpretation

- Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River Watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Recreation

- Promote high quality, public recreational opportunities in the Connecticut River Watershed that are complementary between ownerships and provide regional linkages, with emphasis on promoting wildlife-dependent activities that connect people with nature in the outdoors

Partnerships

- Enhance the conservation, protection, and stewardship of natural and cultural resources, and promote wildlife-dependent recreation, throughout the Connecticut River Watershed by initiating, supporting, and promoting partnerships with other Federal, State, and local governments, Tribal governments, and private organizations.

II. Project Planning and Design

Project Planning Overview

In 2006, we initiated public and partner scoping as part of the Service's planning process to develop a CCP (<http://www.fws.gov/northeast/planning/index.html>; accessed March 2015). During scoping, we received significant public and partner support for a refuge expansion. Some of that feedback included maps and data depicting recommendations for areas to consider. Over 750,000 acres were identified by our partners. With preliminary information regarding benefits to Federal trust resources, we requested authority from our Director to further evaluate some of these recommendations. In November 2011, the Service's Director approved a Preliminary Project Proposal to allow us to pursue detailed planning for a potential increase in refuge acquisition authority of up to 200,000 acres total in the watershed, approximately twice the size of our existing authority.

We began detailed planning by evaluating the effectiveness of the 1995 FEIS refuge land acquisition strategies where 65, often small SFAs, primarily tied to federally listed species, wetlands, and rare plant communities, were identified for acquisition. Many of the acquired parcels to date may contain breeding habitat for federally listed or rare species and, thereby, offer an important, immediate, and direct level of protection for those site specific individual populations; however, over the long term, the distribution of small, scattered parcels does not consider other important factors. For example, this strategy does not consider species' travel or movement corridors. Nor does it necessarily provide for important habitats used by the species outside of breeding season. It also does not adequately resolve threats on adjacent or nearby lands, or support opportunities to restore habitats on a meaningful scale or in a sustainable way. Finally, this strategy does not address the potential impacts from climate or land use changes. Each of these considerations is important to address when considering the long-term viability of species populations and habitats in the watershed.

Administratively, we have found that managing small, scattered parcels is also financially and operationally inefficient when considering resource investments and cost per acre. The resources expended to get staff and equipment to these sites to manage small units (e.g., post boundaries, brush vegetation, mow fields, conduct surveys, maintain trails and facilities, resolve encroachments, and conduct law enforcement) is much less efficient on a cost per acre basis compared to larger, more contiguous and resilient parcels where more acres can be treated on a single trip. We also believe this acquisition strategy will not be effective in protecting species and crucial habitats over the long term, and unnecessarily limits our ability to practice strategic habitat conservation and fulfill the refuge's purposes.

In our judgment, due to the biological, ecological, and administrative concerns we raise above, the SFA strategy for refuge land acquisition is not in the best interest of the American public because taxpayer's monies can be used more efficiently and effectively. Furthermore, this approach restricts our flexibility in addressing other factors necessary for conserving Federal trust species on a larger landscape and regional basis.

Our current project proposal adjusts the 1995 FEIS's land protection objectives and no longer pursues a "checkerboard pattern of ownership", including the SFAs with "many small scattered sites" (1995 FEIS, Appendix 2-1 Land Protection Plan). We redirected our focus to strive for larger, more contiguous areas to protect a broader array of Federal trust resources while also providing more flexibility and capability to adapt to climate and land use changes on the landscape.

Throughout the planning process, relevant new information frequently became available which created both challenges and opportunities. Forward momentum was often intentionally slowed as new data was considered for our proposal strategy. We spent 2012 and 2013 evaluating the best available information and working with

partners to refine our refuge proposal. Beginning in 2014, we also participated in a collaborative partnership planning process to develop a landscape conservation design for the watershed. We describe that effort in more detail below under “Relationship of Project to Connecticut River Watershed Landscape Conservation Design (LCD).” The results of that planning effort, including the principle product of a strategic core-connector network design, also informed and reinforced our project proposal, approach, and understanding of our value and role within the larger conservation landscape.

The following LPP project goals were developed to provide a framework for our analysis:

Conserve Priority Conservation Targets

To this end, we collaborated with a diversity of public and private stakeholders, including the four State natural resources agencies in the watershed and our Federal agency partners, to identify priority species and habitats of conservation concern. These entities helped us compile known information on Federal trust resource occurrences and associated important habitat areas. In particular, we targeted our interests on habitats supporting federally listed species, migratory birds in decline, and waterfowl as directed by the Refuge System’s Strategic Growth policy. Each of the States, and several conservation organizations, identified their priority focal areas for additional conservation, and we discussed with them throughout the planning process ways to complement their land protection and management efforts as we developed and refined our areas of consideration. We also consulted the Connecticut River Watershed LCD final decision on a strategic core-connector land protection network in assessing our final proposal. Attachment III provides an example of how several of our proposed Conservation Focus Areas (CFAs) overlap with the final LCD core-connector network. A shared priority among our partnership is to maintain a well-distributed diversity of habitat types in the watershed to support healthy populations of native fish and wildlife that will be resilient to anticipated changes in climate and land uses.

Provide Habitat Connections

We worked with our partners to identify key habitat connections for Federal trust species and other respective State species of concern within the existing and potential conservation landscape. Collectively, we considered habitat diversity and connectivity in area (size), elevation, latitude, aspect, process, and landform. In addition, we also identified areas that would serve as important connections for protecting biological integrity and ecosystem health, and contribute to ecosystem services (e.g. water quality and quantity, and carbon sequestration). The Connecticut River Watershed LCD core-connector network design became a valuable tool for evaluating and verifying our consistency with this goal in our proposal.

Incorporate Adaptation Strategies for Predicted Climate and Land Use Changes

We also considered how connections to other existing conserved lands would promote representation, redundancy, and overall resiliency within the watershed knowing these factors would help provide flexibility in the landscape for species and habitats to adapt to impacts from land use, demographic shifts, and climate changes. We sought the best available science to evaluate opportunities to address climate change. In addition, to the Connecticut River Watershed LCD core-connector network product, we compared that project’s modeling results depicting an index of ecological integrity, climate persistence, and urban growth across the watershed (<http://www.umass.edu/landeco/research/dsl/dsl.html>; accessed April 2015). We also considered The Nature Conservancy (TNC) resiliency mapping (<http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx>; accessed May 2014), a considerable amount of digitally available species and ecosystem data from the four watershed States’ natural resource agencies, and other sources of resource data that is publically available.

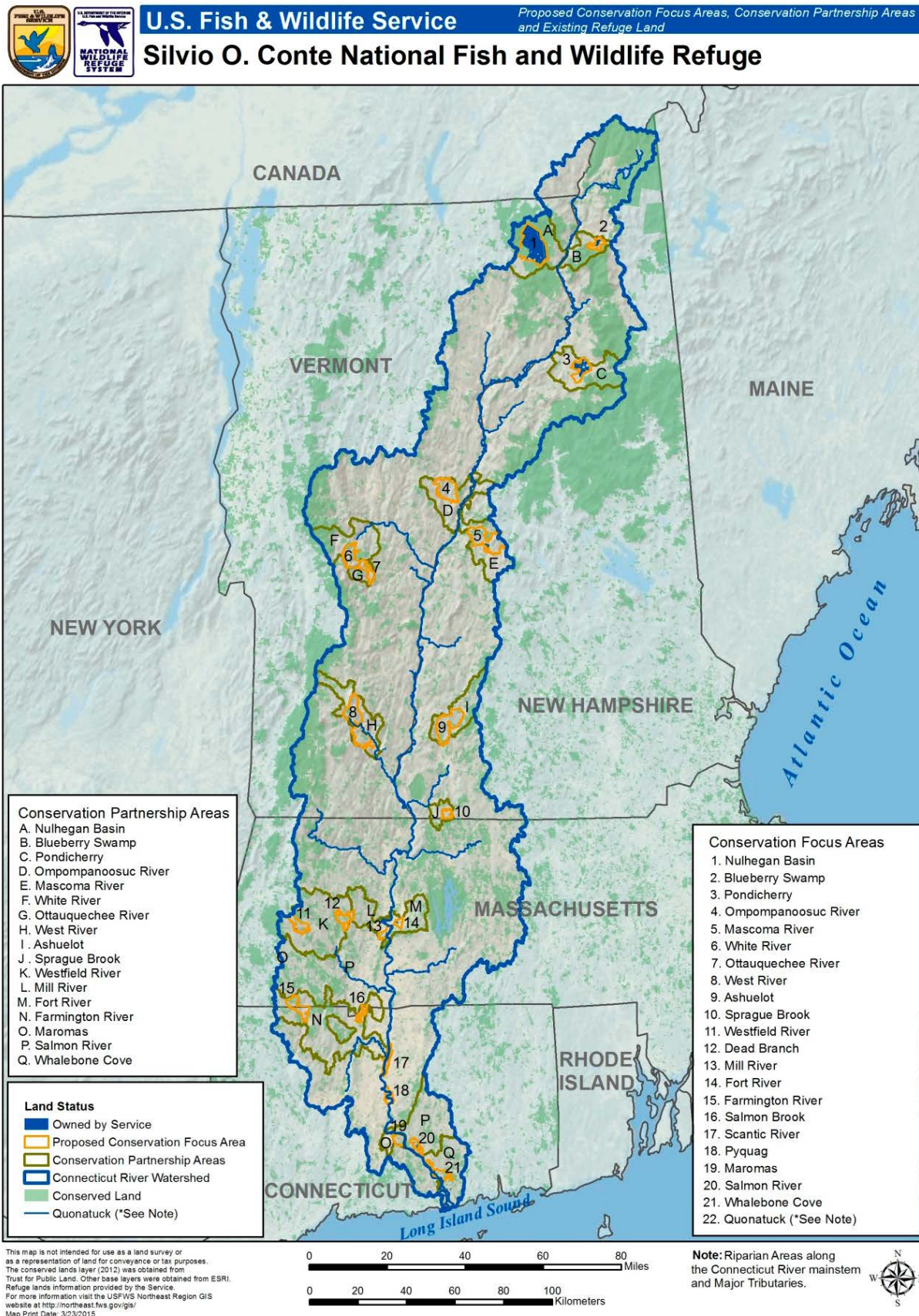
We also considered how existing and proposed refuge lands could benefit the near- and long-term desirable outcomes for species migration, emigration, and potential adaptation opportunities under predicted land use and climate changes. For example, the barrier-free segment near the river’s mouth creates opportunities, over time, for the landward migration of the coastal wetland complex from the Long Island Sound which can be enhanced through the strategic placement of protected land in this reach of the river.

Project Design

Conservation Partnership Areas (CPAs)

We collaborated with State, Federal, and non-governmental partners to define and delineate Conservation Partnership Areas (CPAs) within the watershed. In response to their input, we delineated 17 CPAs that comprise approximately 1.2 million acres, or about 17 percent of the entire watershed (map C.3). CPAs are

Map C.3. Proposed Conservation Partnership Areas and Conservation Focus Areas



generally defined along a subwatershed boundary that includes one or more 12-digit U.S. Geological Survey (USGS) hydrologic units (HUCs) (http://nh.water.usgs.gov/projects/ct_atlas/water_wsheds_huc.htm; accessed August 2013). Watershed boundaries are used because of their familiarity to our partners, their significance to both aquatic and terrestrial ecological systems, and because they are a relevant context for describing ecosystem services important to watershed communities.

CPAs are essentially large areas of mixed ownership where concentrations of Federal trust and other resources of conservation concern occur. They may include important working forests and farms, or provide key connections between protected areas of high conservation, socio-economic, and outdoor recreational value. CPAs are areas where our partnership agreed that refuge staff should focus leadership, resource expenditures and expertise, and support conservation efforts by our partners.

Specifically, CPAs identify where our refuge staff would plan to focus their limited resource expenditures (e.g. staff, funds, equipment) and help facilitate the work of our partners consistent with our goals and objectives for the watershed and refuge purposes. In many instances, refuge and other Service staff would serve a supporting role in partner-led efforts on other ownerships. It is not assumed that refuge staff would take the lead role in all conservation activities in CPAs. Grants, private lands programs and coordination, technical forums and information exchanges, shared equipment, cooperative management agreements, leases, various conservation easements, and fee title acquisition, would all be actions to consider as we work in partnership with others. In particular, we would facilitate landowner enrollment in State and Federal voluntary and incentive based conservation programs that protect and improve wildlife habitat, protect working farms and forests, support public access for outdoor recreation, provide related and sustainable economic opportunities, and support other land uses that would benefit conservation. The Connecticut River Watershed LCD core-connector network design will be especially helpful in our strategic partnership approach within the CPAs, as well as elsewhere within the watershed.

Conservation Focus Areas (CFAs)

We also worked with our partners to delineate 22 CFAs, which are imbedded in CPAs (map C.3). The CFAs range in size from 1,662 acres (Fort River Division, Massachusetts) to 32,541 acres (Nulhegan Basin Division, Vermont). CFAs are areas where the Service would focus land acquisition efforts for Conte Refuge (fee title and easement) to make important contributions to the priority conservation targets established by the Refuge System's Strategic Growth Policy and to help achieve other Service goals and objectives.

We believe that concentrating refuge ownership into 22 large, biologically intact, and ecologically resilient CFAs is significantly more effective than the 65 scattered, small SFAs proposed in the 1995 FEIS. Nevertheless, most of the CFAs proposed in this LPP include many of the original SFAs, or accomplish much of the intended outcomes of those that were omitted. Ten of the 1995 SFAs were the basis for establishing existing refuge divisions which we propose to enlarge further in this LPP. Seven additional SFAs are identified in the 1995 FEIS and are expanded as CFAs in our proposal. These 7 CFAs do not currently exist as refuge divisions since no first parcel has been acquired. Once land is acquired for the refuge within a CFA, we would administratively refer to it as an established refuge division. The remaining 5 CFAs in our proposal were not originally identified as SFAs in the 1995 FEIS, but their contribution to conserving Federal trust resources warranted their inclusion. Lands already in permanent conservation ownership, and/or which are highly productive agricultural lands, are not targeted for acquisition.

The following three criteria were primarily used to delineate and refine specific areas for inclusion in CFAs:

- Contributes to the recovery of federally listed species, including the protection of critical, occupied, or historic habitat for those species.
- Contributes to sustaining populations of migratory birds in decline by protecting breeding, migration, and wintering habitat.

- Contributes to sustaining populations of waterfowl identified as priority species in the North American Waterfowl Management Plan (NAWMP) and Atlantic Coast Joint Venture (ACJV) Implementation Plan.
- Contributes toward the refuge purposes legislated by Congress in the Conte Refuge Act of 1991.

Other criteria used to delineate and refine CFAs were:

- Protects and enhances habitat connections (including size, latitude, elevation, and aspect) for terrestrial and aquatic species to provide vital habitat, and effective areas for movement, migration, and natural processes to promote potential emigration that could complement other wildlife adaptation strategies to offset the expected effects of climate and land use changes.
- Contributes to clean water, clean air, floodplain protection, and maintaining biodiversity and ecosystem health, and addresses threats to those ecosystem services.
- Contributes to the protection and restoration of species and habitat types considered rare, imperiled, or exemplary.
- Contributes to conserving our Federal trust resources by strategically protecting important aquatic and upland habitats in an amount and distribution that promotes habitat representation, resiliency, and redundancy.
- Facilitates the implementation of priority actions of the North Atlantic LCC, State WAPs, and other high priority plans and initiatives.
- Facilitates the implementation of the Connective River Watershed LCD project, including the protection of core areas or their connectors within the existing 1.8 million-acre conservation mosaic.
- Complements and anticipates partners' planned contributions to the current and future conserved lands network.
- Improves administrative efficiencies by delineating a boundary that is more accessible and operationally efficient, following prominent features to reduce impact from adjacent uses, promote access and visibility of refuge lands, and conserve operational funding through reductions in maintenance and administrative costs.
- Assumes Service acquisition from willing sellers within these CFAs over time as lands become available, there is an agreement in terms and price, and land acquisition funding is available.

In general, each CFA includes a core biological area that is based on the needs of identified priority resources of conservation concern using current data obtained from States and other organizations. For each individual CFA, we identify the priority resources of concern that would guide future management under Service ownership (re: appendix A in the draft CCP/EIS). We also used the analysis and results of the Connecticut River Watershed LCD core-connector network to further evaluate and affirm whether areas we identified are strategic for conserving priority species, their habitats, and diverse ecosystems across the watershed. Table 1 summarizes the priority wildlife and fish species that occur in the watershed that will benefit from our proposal. Attachment III provides an example of how the Connecticut River Watershed LCD core-connector network aligned with our CFAs.

Table C.1. Priority Wildlife and Fish Species Occurring in the Connecticut River Watershed Benefiting from the Conte Refuge Land Protection Project Proposal

Priority Species of Concern (*NALCC representative species are in bold)	NALCC ¹	BCC (BCR 30) ²	BCC (BCR 14) ²	Federally Threatened and Endangered Species	Petitioned for Federal Listing ³	Service's Northeast Region Fisheries Strategic Plan: 2009 to 2013	Listed in Refuge Purposes	BCR 30 ⁴	BCR 14 ⁴
Alewife	x					x	x		
American bittern		x	x					M	M
American black duck	x	x	x				x	HH	HH
American eel					x	x			
American oystercatcher	x	x						HH	M
American redstart									HR
American shad	x					x	x		
American woodcock	x	x	x					HH	HH
Atlantic sturgeon			x			x			
Bald eagle		x	x				x	M	M
Baltimore oriole								HR	
Bicknell's thrush	x		x		x			H	HH
Black-and-white warbler								HR	
Black-billed cuckoo									HR
Blackburnian warbler									HR
Black-throated blue warbler									HR
Black-throated green warbler									HR
Blueback herring						x	x		
Blue-winged warbler	x	x	x					HH	H
Bobolink	x								
Boreal chickadee									HR
Broad-winged hawk								HR	
Brook floater					x				
Brook trout	x					x			
Brown thrasher								HR	

Priority Species of Concern (*NALCC representative species are in bold)	NALCC ¹	BCC (BCR 30) ²	BCC (BCR 14) ²	Federally Threatened and Endangered Species	Petitioned for Federal Listing ³	Service's Northeast Region Fisheries Strategic Plan: 2009 to 2013	Listed in Refuge Purposes	BCR 30 ⁴	BCR 14 ⁴
Bufflehead		x						H	
Canada goose, Atlantic	x	x						HH	
Canada goose, north Atlantic		x	x					H	H
Canada warbler	x		x					M	HH
Chestnut-sided warbler									HR
Chimney swift								HR	
Cobblestone tigerbeetle					x				
Dwarf wedgemussel	x			x		x			
Eastern kingbird								HR	
Eastern small-footed bat					x				
Eastern towhee								HR	
Field sparrow								HR	
Gray catbird								HR	
Great crested flycatcher								HR	
Jesup's milk-vetch	x			x					
Least tern		x						H	
Lesser yellowlegs		x	x					M	
Little brown bat					x				
Louisiana waterthrush								HR	
Mallard		x						H	
Marsh wren								HR	
New England cottontail rabbit	x			x					
Northeastern bulrush	x			x					
Northern flicker								HR	
Northern long-eared bat				x					

Priority Species of Concern (*NALCC representative species are in bold)	NALCC ¹	BCC (BCR 30) ²	BCC (BCR 14) ²	Federally Threatened and Endangered Species	Petitioned for Federal Listing ³	Service's Northeast Region Fisheries Strategic Plan: 2009 to 2013	Listed in Refuge Purposes	BCR 30 ⁴	BCR 14 ⁴
Northern parula									HR
Olive-sided flycatcher			x						H
Osprey							x		
Peregrine falcon		x	x				x		M
Pied-billed grebe		x	x						
Prairie warbler	x	x						HH	
Puritan tiger beetle	x			x					
Purple finch									HR
Rose-breasted grosbeak									HR
Ruffed grouse									HR
Rusty blackbird		x	x					H	H
Saltmarsh sparrow	x	x	x					HH	
Scarlet tanager								HR	
Seaside sparrow	x	x						M	
Semipalmated sandpiper	x	x	x					H	HH
Short-billed dowitcher		x						H	H
Shortnose sturgeon	x			x		x	x		
Small-whorled pogonia	x			x					
Snowy egret		x	x					M	
Solitary sandpiper		x	x					H	
Tri-colored bat					x				
Veery									HR
Virginia rail		x							
Whip-poor-will		x						H	M
Willow flycatcher								HR	
Wood duck			x					M	M
Wood thrush	x	x	x					HH	HH
Worm-eating warbler		x						H	

Priority Species of Concern (*NALCC representative species are in bold)	NALCC ¹	BCC (BCR 30) ²	BCC (BCR 14) ²	Federally Threatened and Endangered Species	Petitioned for Federal Listing ³	Service's Northeast Region Fisheries Strategic Plan: 2009 to 2013	Listed in Refuge Purposes	BCR 30 ⁴	BCR 14 ⁴
Yellow-bellied sapsucker									HR
Yellow-throated vireo								HR	

Reference Notes:

¹ LCC – 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan

² BCC (BCR 30, 14)- 2008 USFWS Birds of Conservation Concern for Bird Conservation Regions 30 and 14. Note: The resident game species and waterfowl were added to this list from the Land Acquisition Priority System.

³ Species petitioned to be federally listed as threatened or endangered as of 2010

⁴ BCR - Bird Conservation Region Plans–Rankings: HH–highest; H–high; M–medium; HR–high BCR responsibility

Also, in section III below, under “Relationship of Project to Refuge System Policy on Strategic Growth,” we describe in more detail how the following priority species of conservation concern meet the criteria cited in policy and would benefit from this proposal:

- Seven federally listed wildlife and fish species; an additional species proposed for Federal listing; and, one Federal candidate species.
- Three federally listed plant species.
- Twenty-four migratory landbirds of conservation concern (from Regional BCC 2014 list, and BCR 30 and 14 plans).
- Six waterfowl species of conservation concern (from Regional BCC 2014 list, BCR 30 and 14 plans, and ACJV).
- Twenty-eight representative (e.g. surrogate) terrestrial species (with some overlap in bulleted listings above), which in turn, represent over 100 benefitting species.
- Six representative (e.g. surrogate) aquatic species (list of benefitting species not determined yet).

External boundaries of CFAs are delineated to encompass the core biological area, but may be extended further to establish an effective administrative boundary, avoid redefining (dividing) ownership parcel lines, or to make a critical connection to other conserved lands.

One CFA is an exception to our presentation of discreet individual CFA boundaries. The Quonotuck CFA is conceived as 8,000 acres of priority habitat to be protected along the river's mainstem and its major tributaries (map C.3). The CFA's boundary approximates the 100-year floodplain for the mainstem and thirteen tributaries, as defined by the Federal Emergency Management Agency (FEMA; <http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping#2>; accessed March 2015). The 8,000 acres targeted for the Quonotuck CFA is in addition to the acreage identified for 6 other delineated CFAs that lie within, or partly within, the 100-year floodplain of the Connecticut River and its major tributaries.

Our priority in the Quonotuck CFA would be conserving functioning or restorable floodplain forests and wetlands, as well as tidal (salt, brackish, and freshwater) wetlands. We would seek to protect these habitats where they currently occur, where they can be restored, and/or where they are projected to migrate to in the future due to climate change and anticipated increases in sea level. We would also focus on conserving ownerships that include river frontage in these key areas. Areas of particular interest are depicted on map C.4. These highlighted areas were mapped by TNC to include existing floodplain forest, or areas of high potential for restoration where geomorphic characteristics favor the development of floodplain forest. Generally, we are assuming that this CFA would represent approximately 1,500 acres of tidally influenced wetlands and floodplain habitat along the mouth and lower extent of the river in Connecticut, approximately 1,500 acres of floodplain forest along the river in Massachusetts, and approximately 5,000 acres of floodplain forest along the upper portion of the river and distributed evenly between New Hampshire and Vermont.

The location and juxtaposition of all the CFAs within the larger existing conservation landscape would serve a critical role in connecting to an existing robust and very diverse conservation lands partnership. This contribution would also add value to the Service's investment in Conte Refuge. Protection of these areas in perpetuity would ensure that habitats remain intact and structurally and functionally sound to support species of conservation concern, and promote a more sustainable and resilient working landscape into the future as enumerated earlier.

III. Project Relationship to Service Directives and Initiatives

Relationship of Project to Strategic Habitat Conservation (SHC)

The Service adopted SHC as a science-based framework for making decisions about where and how to deliver conservation efficiently to achieve specific biological outcomes (<http://www.fws.gov/landscape-conservation/shc.html>; accessed April 2015). In collaboration with our partners, the public, and landowners, SHC is a way of thinking and doing business that requires us to set specific biological goals, allows us to make strategic decisions about our work, and encourages us to constantly reassess and improve our actions. The SHC framework integrates planning, design, delivery, and evaluation through an adaptive management approach.

Four principles guide SHC implementation:

- Start with ecologically meaningful scales.
- Work in partnership to maximize effectiveness and efficiency.
- Implement through an adaptive management framework.
- Use science and tools.

This project proposal embraces the concepts and all four principles of SHC. For example, we broadened our scope beyond existing refuge lands to make a concerted effort to integrate and complement the accomplishments of our partners within the watershed. The draft plan is proactive in confronting the challenges posed by climate change, invasive species, and habitat fragmentation due to changes in land use. Planning for an entire watershed of this size ensures a meaningful scale where results can be measured and monitored. Refuge goals, objectives, and strategies, as outlined in the draft CCP/EIS and this LPP, integrate refuge planning, management, and other related actions into the larger watershed landscape context and support the strategic collaborative, Connecticut River Watershed LCD project described below.

In support of the SHC framework, our proposal is consistent with and incorporates the best available science and strategies, responds to current and anticipated future conditions, encourages collaboration and leveraging with partners, and inspires action that makes effective and efficient use of available resources. All combined, these actions magnify and enhance the beneficial impacts of past and will guide future accomplishments within the landscape. Our proposal offers a spatially explicit strategy and depiction of desired future conditions, and helps provide a shared and adaptable strategy for achieving those conditions.

Together with management direction detailed in the draft CCP/EIS, we define clear priorities for wildlife and habitat conservation, and propose to implement these larger-scale conservation actions with multiple, and perhaps a few unconventional, partners. We would also continue our concerted efforts to promote communication and collaboration with the conservation, education, recreation, and economic stakeholders in the watershed. And, we would continue to actively work towards a healthy, integrated, and sustainable working landscape in the watershed.

Map C.4. Priority Floodplain Forests Identified by The Nature Conservancy in the Connecticut River Watershed



SHC is by definition an adaptive process, otherwise known as “learning by doing.” There is tremendous interest in the watershed by a variety of partnerships to continue to collaborate and implement priority conservation actions within the framework of SHC. Our longstanding partnerships with Federal and state agencies, and non-governmental organizations, will continue to support implementation of ecoregional and State WAPS. Furthermore, we will continue to integrate our priorities with the North Atlantic Landscape Conservation Cooperative partners (NALCC; see below), an organization which was formed, in part, to implement SHC. As we move forward with implementation of existing and near-term strategies, we would continue to collaborate with others in seeking out new information and monitoring our actions in order to strengthen the scientific basis of our work.

Relationship of Project to Refuge System Policy on Strategic Growth

In June 2014, the Service issued final policy on strategic growth of the Refuge System (<http://www.fws.gov/policy/602fw5.html>; accessed January 2015). This policy lists three priority conservation objectives for all future land acquisition: (1) recovery of federally listed threatened and endangered species; (2) conserving waterfowl by implementing the NAWMP and its Joint Venture implementation plans; and/or, (3) conserving migratory birds in decline identified in Birds of Conservation Concern (BCC) or Bird Conservation Region (BCR) ecoregional plans. This project proposal addresses all three of these conservation targets as described below.

Federally Listed Threatened and Endangered Species

The watershed hosts eleven federally listed threatened and endangered species, one species proposed for federal listing as endangered, and one federal candidate (threatened) species. Ten of these species will benefit directly from land protection outlined in this proposal, although not all of these species’ recovery plans specifically call for refuge land protection. Some recovery plans are over 20 years old and are in need of updating and were developed at times where proposing additional Federal land protection would have been met with resistance and, therefore, it was not considered as one of the potential alternatives or recovery strategies.

Below we highlight four federally endangered or threatened species present in the watershed that would benefit directly from this LPP proposal, and which have recovery plans or 5-year review plans that specifically mention land protection.

Dwarf wedgemussel—Endangered

This freshwater mussel is an inhabitant of muddy sand, and sand or gravel bottoms of rivers and streams. It once occurred throughout the Atlantic coastal plain from North Carolina to New Brunswick, but has been lost from a majority of known sites. Primary threats include habitat loss, habitat fragmentation, and altered natural river processes. Specifically, these threats include loss of riparian buffers, loss of floodplains, altered channel processes, sediment transport and granular sorting, altered hydrology, bank erosion, and dams. Pollutants from industrial and agricultural activities and other sources substantially impact mussel populations which are sensitive to pesticides, chlorine, potassium, zinc, copper, and cadmium (Nedea 2009, USFWS 1993a).

This mussel once occurred along much of the river mainstem and many of its tributaries, but is no longer found in the mainstem in Connecticut and Massachusetts (USFWS 1993a). The species was rediscovered in the upper river in 1995, including 68 sites in the mainstem and 77 sites in tributaries. It occurs along a 16-mile reach of the river mainstem between Orford and Haverhill (New Hampshire) in an area referred to as the Middle Macrosite, and along a 21-mile reach from Dalton to Northumberland (New Hampshire) in an area referred to as the Northern Macrosite (Nedea 2009). Small populations also exist in the Farmington River in the vicinity of Simsbury, Connecticut, in the Fort and Mill Rivers near Northampton and Hadley, Massachusetts, in a different Mill River in Deerfield and Whately, Massachusetts, and in the Ashuelot River near Keene, New Hampshire (Susi von Oettingen, 2010, pers.com. USFWS).

According to the 1993 recovery plan for the dwarf wedgemussel, the actions needed to recover the species include long-term protection of essential habitats through land acquisition and management agreements involving riparian habitat creating stream buffer zones. Where feasible, land acquisition was considered the most effective protection for the species and its habitat (USFWS 1993a). The dwarf wedgemussel occurs in two of the proposed CFAs: predominately in the Quonotuck CFA, which includes portions of the 100-year floodplain along the mainstem and tributary rivers, as well as the Ashuelot River CFA. The Ashuelot River is one of two rivers in the upper watershed where significant numbers of mussels have been found. The species also occurs in the Fort River, near the proposed

CFA, and historically occurred in the Mill River CFA. By acquiring land in these CFAs, we can benefit dwarf wedgemussel by permanently protecting its habitat and contributing to water quality protection.

Jesup's milk-vetch—Endangered

This plant exists only in the watershed and is confined to calcareous bedrock outcrops which are ice scoured annually (USFWS 1989). The only three known sites occur along a 16-mile stretch of the river in the towns of Plainfield and Claremont, New Hampshire and Hartland, Vermont. Habitat alteration and botanical collecting have been the major impacts to this plant. Trampling by humans also poses a threat due to canoe and kayak portaging near one site. An invasive plant, black swallow-wort, has expanded into the area from the nearby railroad tracks and threatens to displace the milk-vetch. Partners have worked to control the black swallow-wort.

The recovery plan for this species was issued in 1989 (USFWS 1989). The permanent protection of the plant's essential habitats was a high priority in the recovery plan. Protection measures listed included conservation easements, direct land acquisition, or other agreements with landowners. The 5-year review in 2008 stated that the plant continued to experience a high degree of threat and reaffirmed that the permanent protection of its known sites is critical (USFWS 2008b). In 2009, a Spotlight Species Action plan was completed specifically highlighting land acquisition by the refuge as part of the Service's role and responsibility in the species' protection and recovery (USFWS 2009b). The Quonotuck CFA proposed in this LPP encompasses these three sites.

Northeastern bulrush—Endangered

This plant is found in alluvial meadows and small headwater or coastal plain ponds characterized by seasonally variable water levels. Approximately 113 populations are known from 7 eastern States, with most of the populations occurring in Pennsylvania and Vermont (USFWS 2008). Within the watershed, 2 sites are known in Massachusetts, 9 in New Hampshire, and 22 in Vermont. Habitat alterations that make conditions consistently wetter or drier are the major threat to this species (USFWS 2006). Other threats include agricultural runoff, logging roads, fire roads, offroad vehicle use, and unauthorized collection. The Putney Mountain unit of the refuge, located in southern Vermont, was purchased to protect a population of this plant.

The recovery plan for this species was issued in 1993 (USFWS 1993c). This recovery plan for this species called for protection measures such as land acquisition and conservation easements (USFWS 1993c). The 5-year review echoed these recommendations, stating that the highest priority actions are to resurveying populations that have not recently been surveyed, securing protection on public and private lands, conducting periodic surveys of populations to determine trends and threats, and implementing management tools to reduce threats and monitor effectiveness of these actions (USFWS 2008). The 5-year review also stated that the species has high recovery potential. The northeastern bulrush occurs in small isolated wetlands in the West River CFA proposed in this LPP. Acquisition of these sites could help contribute to the species recovery.

Puritan tiger beetle—Threatened

The Puritan tiger beetle is an inhabitant of sandy riverine beaches along the river mainstem and sandy bluffs along the Chesapeake Bay in Maryland. The Puritan tiger beetle has declined along the river due to inundation and disturbance of its shoreline habitat from dam construction, riverbank stabilization, and human recreational activities. In addition, the flood control projects designed to control the river flows have also impacted the natural transport, deposition, sorting of sediment, and distribution of grain size. These alterations have impacted the availability of suitable habitat for the beetle. Of 11 known historic populations along the river, two remain (USFWS 1993b). One occurs in Northampton, Massachusetts, on a river beach owned by the City of Northampton and the Massachusetts Division of Fisheries and Wildlife. The numbers of adult beetles in this population decreased in the late 1980s, dropping below 50 adult beetles. Refuge staff and partners have been making a concerted effort there since 1996 to protect and augment this population from source populations in Connecticut. The last year beetles were reintroduced to the Northampton site was in 2006. In 2005, the number of adult beetles rose to 200, although it has declined since then. The other is a meta-population is near Cromwell, Connecticut, and comprises 350 to 500 individuals at three sites in close proximity. The Service recently purchased a 30-acre parcel for the refuge (Deadman's Swamp Unit) that supports adult beetles, although no larvae have been found there to date.

The recovery plan for this species was issued in 1993 (USFWS 1993b). The recovery plan called for protecting a minimum of three metapopulations established or maintained along the species historic range along the river. The 5-year review completed in 2007 recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of the river shoreline habitat supporting beetles (USFWS 2008). The Mill River and Quonotuck CFAs both support populations of the Puritan Tiger beetle. Land acquisition or conservation easements in these areas could help contribute to the species' conservation.

In addition to the four species above, there are six other federally listed or candidate species in the watershed that will benefit from our proposed LPP; however, these species respective recovery plans did not specifically identify land protection as a strategy. As noted above, many of these recovery plans are dated to a time when proposing land protection was not considered to be a viable option, or no recovery plan has been developed yet.

Shortnose sturgeon–Endangered

The shortnose sturgeon was first listed as endangered in 1967. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) published a shortnose sturgeon recovery plan in 1998. Although the sturgeon has disappeared from some rivers, it is still found in many rivers from Florida to New Brunswick. The Connecticut River population is considered one of 19 separate distinct population segments of this species in need of recovery.

Although it inhabits the river from Turners Falls, Massachusetts, to Long Island Sound, the Holyoke Dam separates the shortnose sturgeon into two populations. The total upriver population estimates ranged from 297 to 714 adult sturgeon (with less than 100 of those spawning in a given year), while the downriver population (which cannot reach the upstream spawning area) was estimated at around 875 adults. Recent evidence indicates that no successful reproduction occurs in the population below the Holyoke Dam. This downstream population is sustained by the influx of out-migrating sturgeon from the upstream group. Spawning in the river occurs from the last week of April to mid-May, as the spring flows wane, in specific rubble/boulder substrate. The primary impediment to sturgeon recovery is the presence of dams that obstruct migration and modify the historic flow regimes that cued the fish to spawning at appropriate times and places.

The Quonotuck CFA proposed in this LPP could benefit shortnose sturgeon by contributing to water quality protection by conserving lands adjacent to the river's mainstem.

Atlantic Sturgeon–Endangered

NOAA listed four Atlantic sturgeon distinct population segments (DPS) as endangered under the Endangered Species Act (ESA) in 2012. One of these distinct populations, the New York Bight DPS, includes habitat in the Connecticut River.

Atlantic sturgeon is managed under a Fishery Management Plan administered by the Atlantic States Marine Fisheries Commission (ASMFC). The plan includes measures for habitat conservation, restoration and improvement, monitoring of bycatch and stock recovery, and breeding/stocking protocols. There is also a State and Federal coast-wide moratorium on harvest of Atlantic Sturgeon (NOAA 2014).

Except for the occasional migrating individual, Atlantic sturgeon are rare in the river. In 2014, juvenile Atlantic sturgeon were found in the lower portion of the river. This documentation provides increased chances for recovery of this species in the river. The Quonotuck CFA and many of the CFAs in Connecticut proposed in this LPP could benefit Atlantic sturgeon by contributing to water quality protection from land conservation along the river mainstem.

Red Knot–Threatened

In December 2014, the Service listed the *rufa* red knot as federally threatened (79 FR 73706-73748). The "rufa" subspecies of red knot (*Calidris canutus rufa*) winters near the tip of South America and begins its long journey north to Arctic breeding grounds in mid-February, when they spend time at a number of coastal habitats along eastern North America, particularly Delaware Bay beginning in mid-May. The species has been recorded during migration along the coasts of Connecticut, Massachusetts, and New Hampshire. Major threats to the subspecies include loss of breeding and nonbreeding habitat, predation during breeding, reduced prey availability, and mismatches in the time of the species migrations and the availability of food and favorable weather conditions. Two of the proposed CFA may provide migrating habitat for red knots: Whalebone Cove and Salmon River CFAs.

Canada Lynx–Threatened

Lynx were historically found from Alaska to the Canadian Maritime Provinces, extending south in the Rocky Mountains, around the Great Lakes, and into New England. Today the species is secure in Alaska and Canada, but imperiled or extirpated in the continental U.S. Lynx occur in boreal and montane landscapes dominated by coniferous or mixed forest with thick undergrowth interspersed with more open habitats and young forests that support their principal prey, snowshoe hare.

Lynx are relatively rare in the contiguous U.S. because of habitats that are inherently unable to support cyclic, high-density snowshoe hare populations and are thus unable to sustain cyclic lynx populations (USFWS 2009). The principal factor affecting softwood forest types favored by lynx is timber harvest on non-Federal lands, however the influence of current forest practices on lynx is not known.

Lynx have been confirmed breeding in northeastern Vermont and New Hampshire. A family group was detected in the winters of 2012 and 2013 within the refuge's Nulhegan Basin Division. Lynx may also use habitats within the refuge's Pondicherry and Blueberry Swamp divisions since tracks have been found in the general area, although evidence of lynx at these divisions has not been detected.

There is currently no recovery plan for the Canada lynx, however, the Service has drafted a recovery outline for this species, an interim document prepared in advance of a Recovery Plan (USFWS 2005). The outline describes core, secondary and peripheral habitats areas that are believed to be important to the Canada lynx. The outline also lists preliminary actions needed for the species' recovery including retaining adequate habitat and management commitments in core and secondary areas, identifying and maintaining landscape connectivity between Canada and the contiguous U.S., and between core areas, identifying habitat and population limiting factors, and developing a post-delisting monitoring plan. In the recovery outline, the Upper Connecticut River Valley is included as a peripheral recovery area for the Canada lynx. However, since the recovery outline was drafted, recent sightings and data (2012-2013) show that Canada lynx are successfully reproducing on the existing Nulhegan Basin Division. A lynx has also been confirmed at the Pondicherry Division. Land acquisition or conservation easements within and in the vicinity of the Nulhegan Basin CFA and Pondicherry CFA to help protect core and connecting habitats may help benefit Canada lynx.

Northern long-eared bat–Threatened

In the Northeast, populations of northern long-eared bats have declined by 99 percent primarily due to white-nosed syndrome, a fungal disease. This medium-sized bat is especially susceptible to the disease in their wintering hibernacula; namely, caves and mines. These bats typically use large caves or mines for hibernacula, with large passages and entrances, constant, cooler temperatures, and high humidity with minimal air currents. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

During summer, the bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees in a wide variety of forested and wooded habitats. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. Potential roosts can include live trees and/or snags greater than or equal to 3 inches diameter-at-breast height that have exfoliating bark, cracks, crevices, and/or cavities. It has also been found, rarely, roosting in structures like barns and sheds. Breeding begins in late summer or early fall when males begin swarming near hibernacula. Potential habitat for the species exists throughout the watershed. The species has been documented occurring in at least three of the proposed CFAs: Ompompanoosuc River, Ottawaquechee River, and White River CFAs.

The northern long-eared bat was listed in April 2015 (80 FR 17974). As such, the species does not yet have a recovery plan. Additional land protection is not expressly identified as a conservation effort at the time of listing; however, several measures are identified to protect hibernacula and summer breeding and maternity colonies from disturbance. These include: taking steps to minimize disturbance and vandalism at bat caves, such as installing bat-friendly gates, using best management forestry practices to conserve and restore forested and riparian habitats, establishing protection buffers around hibernacula, and limiting tree-clearing activities in winter to protect maternity colonies and in summer to protect non-flying pups.

New England Cottontail (NEC)–Candidate (Threatened)

The range of this once widespread rabbit has decreased by about 86 percent since 1960 (Fuller and Tur 2012). The primary cause seems to be a reduction of early successional forest habitat. Other factors include

high predation rates due to small, fragmented habitat patches, and gradual displacement by exotic Eastern cottontails which use a wider variety of habitats and appear to be less susceptible to predation.

Recent surveys have revealed that the NEC still occurs in scattered areas of Rhode Island, New Hampshire, and southern Maine, as well as Cape Cod and western Connecticut. In the watershed, it has only been found in Hartland, New Hartford, East Haddam, and Lyme, Connecticut. Given this conservation urgency, a range-wide NEC Initiative was established. This initiative involves collaboration from multiple agencies, including the Service, State wildlife agencies, universities, the Natural Resources Conservation Service (NRCS), TNC, and the Wildlife Management Institute, to address cottontail conservation on a landscape scale (Fuller and Tur 2012).

Forty-nine focus areas were identified as locations to manage and restore habitat for NEC. Two of these focus areas are within the proposed refuge acquisition boundary (Farmington River and Whalebone Cove CFAs). Early successional management and protection of adjacent natural shrubland habitat will meet the conservation goals set for the NEC.

In 2009, the Service developed a Spotlight Species Action Plan for the NEC. The action plan listed the threats to the species and made recommendation on how the Service and other partners could work together to conserve the cottontail. "A Conservation Strategy for the New England Cottontail" was developed and approved in November 2012, and provides the conservation and habitat management goals and strategies for this species (Fuller et al. 2012). The conservation strategy recognizes the importance of conserving and actively managing habitats to the species' future. Table 7.12 – Land Protection, in chapter 7 of the strategy (objective 801), specifically calls for purchasing lands (in fee or easement) at national refuge lands to be managed to benefit NEC.

Waterfowl

Twenty-seven species of ducks, geese, and swans rely on habitat within the watershed. The lower section of the river supports waterfowl year-round and has some of the highest and most significant concentrations of black duck in the Northeastern U.S. (Dreyer and Caplis 2001). The freshwater and tidal wetlands along the river, particularly in the lower portion of the watershed, provide important stopover habitat during both spring and fall migrations of waterfowl, including the American black duck. The habitats most important to black duck are the tidal wetlands along the mainstem, as well as the tidal wetlands and bays along the coast. In the winter, the river provides relatively ice-free open water habitat providing access to submerged aquatic vegetation, invertebrates and high calorie wetland vegetation. Many waterfowl also nest along the river, including mallards, black ducks, Canada geese, green-winged teals, gadwalls, and common merganser.

Further north in the watershed, many migrating ducks use flooded agricultural fields, floodplains, emergent wetlands, shrub swamps, and backwater areas along the river for stopover habitat. Species such as Canada geese, teal, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river and scattered small wetlands within the watershed provide prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Other species nest along the river and elsewhere within the watershed, but are less common. Wood ducks are ubiquitous nesters in the watershed requiring large tree cavities which are associated with freshwater forested or shrub wetlands. They especially favor beaver ponds with heavy forest cover. Black ducks are a species of special management concern as previously described and are specifically mentioned in the Conte Refuge Act.

The ACJV's 2005 Revised Waterfowl Implementation Plan, a step-down plan from the NAWMP, identified three waterfowl focus areas in the watershed: (1) the Connecticut River and Tidal Wetlands Complex Focus Area ; (2) the Connecticut River Focus Area; and, (3) the Lake

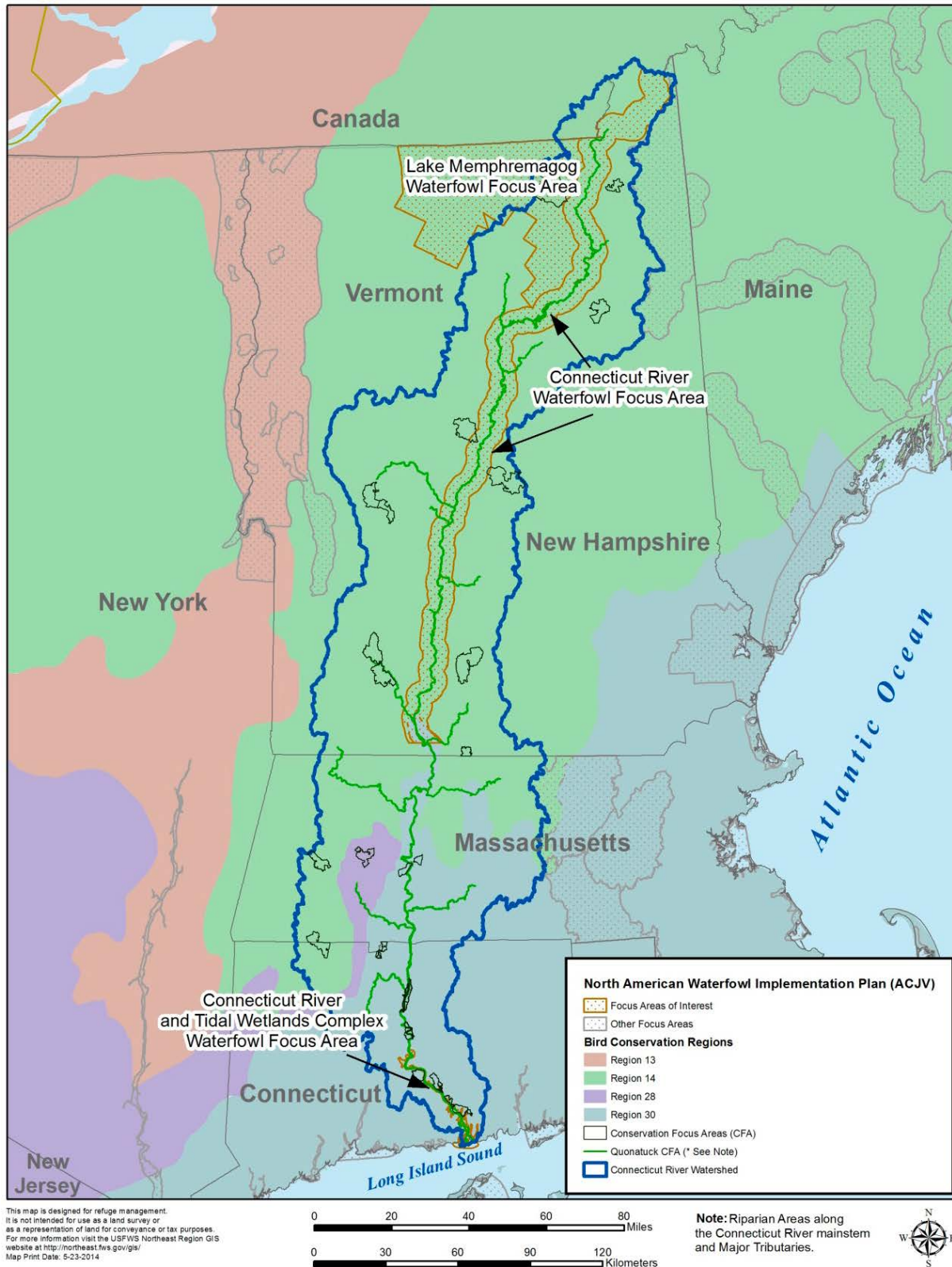
Memphremagog Focus Area (map C.5) (http://www.acjv.org/wip/acjv_wip_northeast.pdf; accessed February 2015). These focus areas highlight the importance of the watershed to breeding, migrating, and wintering waterfowl. For each of these focus areas, the ACJV established habitat objectives to help conserve waterfowl populations. These same three focus areas coincide with target areas identified for American black ducks in the Conservation Action Plan for the American Black Duck (USFWS and Black Duck Joint Venture 2011). The Conservation Action Plan provided conservation recommendations for each target area to help conserve black duck habitats and populations. Below we describe the three waterfowl focus areas, their importance to waterfowl, the species that use these areas, habitat acreage targets, conservation recommendations, and which CFAs occur in these areas.

Map C.5. North American Waterfowl Management Plan/Atlantic Coast Joint Venture Waterfowl Focus Areas and Proximity to Proposed Refuge Conservation Focus Areas



U.S. Fish & Wildlife Service Bird Conservation Regions and Waterfowl Implementation Plan

Silvio O. Conte National Fish and Wildlife Refuge



Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area, Connecticut

This area contains some of the most extensive and highest quality fresh and brackish tidal wetland systems in the Northeast and was designated a Ramsar wetlands of international importance in 1994. The freshwater coves and tidal saltmarshes at the river mouth contain some of the most important areas for migrating and wintering waterfowl in the state. The remaining wild rice marshes in the focus area provide excellent foraging habitat for breeding, staging, and wintering waterfowl. In addition, large concentrations of American black duck, green-winged teal, mallard, and American wigeon use the wetland complex at the mouth of the river. Significant numbers of greater scaup, canvasback, ruddy duck, and Atlantic brant winter within the waterfowl focus area. This focus area encompasses four important bird areas. The area is important to black ducks throughout their annual cycle, providing nesting, stopover, and overwintering habitat.

The ACJV's habitat objective for this waterfowl focus area is 1,157 acres of wetland habitat. The Conservation Action Plan for the American black duck has the following conservation recommendations for this area:

- Cooperative management and conservation agreements to coordinate efforts across a mosaic of ownerships.
- Aggressive management of invasive species, including *Phragmites*, to restore habitats and prevent further degradation.
- Restoration of tidal marshes.
- Land acquisition, particularly of upland areas adjacent to wetland to provide buffers to maintain wetland structure and function.

The Quonotuck, Whalebone Cove, Salmon River, and Maromas CFAs are located in this focus area and land acquisition and protection in this CFA will help address waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.2.

Table C.2. Waterfowl Species Using the Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area, Connecticut

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	✓
Green-winged teal	✓	✓	✓
Mallard	✓	✓	✓
American wigeon		✓	✓
Greater scaup		✓	✓
Canvasback		✓	✓
Ruddy duck		✓	✓
Atlantic brant		✓	✓

Connecticut River Waterfowl Focus Area, New Hampshire and Vermont

The river serves as an important migratory corridor for many species of waterfowl during the spring and fall migrations. Along both sides of the river there are numerous and extensive wetlands areas, such as oxbows, emergent wetlands, floodplain forests, and other forested wetlands, that provide waterfowl stopover, breeding, and wintering habitat. This area also contains prime breeding habitat for wood duck, black duck, mallards, and Canada goose. These habitats are important to black ducks throughout their annual cycle, providing nesting, stopover, and overwintering habitat.

The ACJV's habitat objective for this focus area is 3,450 acres of wetland habitat. The Conservation Action Plan for the American black duck has the following conservation recommendations for this area:

- Land acquisition by the Service (specifically the Conte Refuge) and other partners to protect important habitats.

- Managing and regulating public uses to limit disturbance.
- Controlling exotic species and removing dams to improve native habitats.

The Quonotuck, Ompompanoosuc River, and Mascoma River CFAs are located in this focus area and land acquisition and protection in this CFA will help address waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.3.

Table C.3. Waterfowl Species Using the Connecticut River Waterfowl Focus Area, New Hampshire and Vermont

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	✓
Mallard	✓	✓	✓
Hooded merganser	✓	✓	✓
Common merganser	✓	✓	✓
Canada goose	✓	✓	✓
Wood duck	✓	✓	
Blue-winged teal	✓	✓	
Green-winged teal	✓	✓	
Ring-necked duck	✓	✓	
Common goldeneye		✓	✓
Greater snow goose		✓	
Atlantic brant		✓	

Lake Memphremagog Waterfowl Focus Area, Vermont

The 775,452-acre Lake Memphremagog Waterfowl Focus Area encompasses all of Orleans County, Vermont, and parts of Essex County, Vermont. The area's many remote wetlands have high value for breeding and migrating black ducks and other waterfowl. The area also has several relatively large wetlands and lakes, which provide important deepwater habitat for species such as common loons.

The ACJV's habitat objective for this focus area is 5,101 acres of wetland habitat. This focus area's many, scattered, remote wetlands have high-value for breeding and migrating American black ducks. The Conservation Action Plan for the American Black Duck has the following conservation recommendations for this area:

- Minimizing disturbance to remote wetlands and waterbodies to protect nesting waterfowl by following buffer zones and best management practices during timber harvesting.
- Acquiring additional lands (fee or easement) to protect high-quality habitat, limit shoreline development along ponds and lakes, and prevent disturbance to other wetlands.

The Nulhegan Basin CFA is located in this focus area and land acquisition and protection in this CFA will help address waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.4.

Table C.4. Waterfowl Species Using Lake Memphremagog Waterfowl Focus Area, Vermont

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	
Wood duck	✓	✓	
Blue-winged teal	✓	✓	
Green-wing teal	✓	✓	

Species	Breeding	Migrating	Wintering
Hooded merganser	✓	✓	
Common merganser	✓	✓	
Ring-necked duck	✓	✓	
Canada goose	✓	✓	
Mallard	✓	✓	
Common goldeneye		✓	
Bufflehead		✓	
Lesser scaup		✓	
Greater scaup		✓	

Overall, our land acquisition proposal would make significant contributions toward waterfowl habitat objectives. We anticipate these contributions will meet or exceed the habitat objectives for the ACJV Connecticut River Focus Area and the Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area and contribute significantly to the habitat objectives in the Lake Memphremagog Waterfowl Focus Area (attachment I). The project would contribute to implementing the NAWMP by acquiring lands in the CFAs that overlap these focus areas, and would help meet the population objectives in the respective ACJV plans.

The wood duck is identified as a high priority species for the Atlantic Flyway Council and as a continentally high priority species for the NAWMP and the ACJV. BCR 14 is recognized by the NAWMP as a high priority region for breeding wood duck. BCR 30 is considered a moderate priority region for breeding wood duck. While no regional population objectives have been established for wood duck, the regional priority rankings suggest that the watershed can make significant contributions to sustaining the Atlantic Flyway population at or above target levels for harvest management purposes. Implementation of this LPP would provide significant breeding habitat for American black duck and wood duck, potentially supporting approximately 946 and 4,100 breeding pairs, respectively (attachment I).

Migratory Birds

The watershed serves as one of the major “north-south” migration corridors within the expansive Atlantic Flyway, flanked by the Atlantic coastal corridor to the east and the Champlain Valley corridor to the west. Hundreds of species of migratory and resident birds inhabit the watershed. These species encompass 17 taxonomic orders and 46 families of birds ranging from the well-known Canada goose and American robin to the rare golden-winged warbler and boreal owl (DeGraaf and Yamasaki 2001). Fifteen species of shorebirds, and 24 other water-dependent species such as rails, grebes, and herons, use the watershed for breeding, wintering, or migration. The refuge is also host to 157 passerine species and 24 raptor species. Of these, 88 are neotropical migrants that breed in the watershed, 77 are residents that breed and winter here, and 16 are winter residents that migrate to the watershed from the north. Certain species such as mourning dove, American robin, red-tailed hawk, American crow, cedar waxwing, and American goldfinch have both migratory and resident populations (DeGraaf and Yamasaki 2001). The watershed supports 60 bird species that have been listed by one or more bird conservation plans or initiatives as species of concern.

The contribution to migratory birds and their habitat was a major consideration in delineating CFAs for refuge acquisition. For the purposes of relating those contributions quantitatively, in attachment I to this LPP, we detail the potential number of breeding migratory birds that could be supported within the proposed CFAs, and the acres of potentially suitable habitat.

We compare our estimates for the CFAs and conserved lands to population and habitat objectives that have been established at the BCR and State scales as reported in BCR 14 and BCR 30 conservation plans. Examining the benefits provided by existing conserved lands provides perspective on what additional migratory bird benefits would be provided to the conservation estate by acquiring the proposed CFAs. We profile six neotropical migrant species that are identified as Priority Refuge Resources of Concern (PRRC), are priority species within BCR plans, and which represent the range of upland and wetland habitat types within the proposed CFAs. Those species are:

- Wood thrush.
- Canada warbler.
- Blackburnian warbler.
- Black-throated blue warbler.
- American woodcock.
- Bobolink.

In addition, four of the six species profiled (e.g. wood thrush, blackburnian warbler, American woodcock, and bobolink) are identified as representative species by the NALCC. We also present contributions to neotropical migrant stopover habitat (attachment I).

We summarize the results of our analysis in the table C.5 below.

Table C.5. Contribution of All Proposed CFAs to BCR Population Objectives for Select Migratory Bird Species*

Species	Percent (%) of total BCR 14 population objective supported by all CFAs	Percent (%) of total BCR 30 population objective supported by all CFAs
Wood thrush†	1.8%	0.6%
Blackburnian warbler	3.1%	6.4%
American woodcock	2.2%	2.0%
Bobolink†	<0.1%	1.2%
Black-throated blue warbler	4.3%	17.0%
Canada warbler†	1.6%	11.0%

* The total proposed CFA acreage (197,800 acres) represents 0.2 percent of total BCR 14 acreage, and 0.1 percent of total BCR 30 acreage.

† Species on draft BCC 2014 list; both U.S. breeding and migration habitat limited.

In summary, this LPP would make important contributions toward Regional and State-level breeding population objectives for several neotropical migrant species of conservation concern. In addition, a study of neotropical migrant habitat use during migration suggests that habitat protection, especially forest and shrub wetlands along the mainstem of the river within Connecticut and Massachusetts, will significantly benefit neotropical migrants during the spring migration (<http://www.science.smith.edu/stopoverbirds/index.html>; accessed March 2013).

In table C.6 below, we provide a summary of how our proposed individual CFAs support the three Strategic Growth policy conservation targets.

Table C.6. Summary of the Relationship of Proposed CFAs to the Service's Strategic Growth Policy Conservation Targets.

Proposed Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species*	Waterfowl (NAWMP/ACJV Focus Area Objectives)	Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)
Ashuelot River CFA	Dwarf wedgemussel		Breeding habitat for: Canada warbler Eastern whippoorwill Wood thrush
Blueberry Swamp CFA			Breeding habitat for: Canada warbler Eastern whippoorwill Olive-sided flycatcher

Proposed Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species*	Waterfowl (NAWMP/ACJV Focus Area Objectives)	Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)
Dead Branch CFA			Breeding habitat for: Black-billed cuckoo Canada warbler Eastern whippoorwill Wood thrush
Farmington River CFA	New England cottontail (candidate)		Breeding habitat for: Canada warbler Wood thrush
Fort River CFA			Breeding habitat for: Bobolink Migration habitat for: Canada warbler Wood thrush Olive-sided flycatcher Bobolink
Maromas CFA		ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	Breeding habitat for: Cerulean warbler Wood thrush
Mascoma River CFA		ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	Breeding habitat for: Bobolink Canada warbler Wood thrush
Mill River CFA	Puritan tiger beetle		Migration habitat for: Canada warbler Wood thrush
Nulhegan Basin CFA	Canada lynx	ACJV Lake Memphremagog Waterfowl Focus Area	Breeding habitat for: Canada warbler Eastern whippoorwill Olive-sided flycatcher
Ompompanoosuc CFA	Northern long-eared bat	ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	Breeding habitat for: Canada warbler Eastern whippoorwill Wood thrush
Ottawaquechee River CFA	Northern long-eared bat		Breeding habitat for: Eastern whippoorwill Wood thrush
Pondicherry CFA			Breeding habitat for: Bobolink Canada warbler Eastern whippoorwill Olive-sided flycatcher
Pyquag CFA			Migration habitat for: Canada warbler Wood thrush Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher Bobolink

Proposed Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species*	Waterfowl (NAWMP/ACJV Focus Area Objectives)	Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)
Quonotuck CFA	Dwarf wedgemussel, puritan tiger beetle, Jesup's milk vetch, shortnose sturgeon	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area (CT) and ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	Migration habitat for: Canada warbler Wood thrush Canada warbler Wood thrush Lesser yellowlegs Semipalmated sandpiper Sanderling Wood thrush Olive-sided flycatcher Bobolink Cerulean warbler Saltmarsh sharp-tailed sparrow Whimbrel Black rail Black skimmer
Salmon Brook CFA			Breeding habitat for: Bobolink Migration habitat for: Canada warbler Wood thrush
Salmon River CFA	Red knot (rufus sp.), New England cottontail (candidate)	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	Breeding habitat for: Wood thrush Cerulean warbler Eastern whip-poor-will Black-billed cuckoo Prairie warbler Migration habitat for: Sanderling Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher Cerulean warbler
Scantic River CFA			Migration habitat for: Canada warbler Wood thrush
Sprague Brook CFA			Breeding habitat for: Canada warbler Wood thrush Black-billed cuckoo
West River CFA	Northeastern bulrush		Breeding habitat for: Canada warbler Eastern whippoorwill Wood thrush
Westfield River CFA			Breeding habitat for: Black-billed cuckoo Canada warbler Eastern whippoorwill Wood thrush

Proposed Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species*	Waterfowl (NAWMP/ACJV Focus Area Objectives)	Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)
Whalebone Cove CFA	Red knot (rufus sp), New England cottontail (candidate)	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	Breeding habitat for: Black-billed cuckoo Bobolink Cerulean warbler Eastern whip-poor-will Prairie warbler Migration habitat for: Sanderling Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher
White River CFA	Northern long-eared bat		Breeding habitat for: Canada warbler Eastern whippoorwill

* Species in **bold** are federally listed species that have Service land protection identified as a strategy within their recovery plan. All other species are federally listed and Federal candidate species that do not have land acquisition mentioned in their recovery plan or do not have a recovery plan.

Relationship of Project to NALCC Representative (i.e. Surrogate) Species and Other Priority Species and Habitats

In 2009, the NALCC partnership published a development and operations plan which evaluated 74 species (including plants, all taxa of wildlife, fish, and other aquatic species), of highest priority for conservation for that geographic region based on consultations with BCR teams, ACJV teams, fish habitat partnerships, and the Service's endangered species program. Table 1, presented earlier, lists those species occurring within the watershed. This priority species list served as an initial starting point for biological planning and conservation design within the NALCC, and provided guidance in developing this LPP. This LPP provides important habitat protection and/or potential enhancements for these highest priority species identified in the NALCC plan.

In 2011, the Service began facilitating a process to collaboratively identify "surrogate" species within each geographic LCC. This was a response to addressing the sheer number of species for which the Service, respective States, and other partners work with, and the impracticality of designing and conserving landscape-scale habitats on a species-by-species basis. The basic concept is that conserving habitat for surrogate species will also address the needs of a larger group of species or other conservation targets (e.g., water quality, forest, or grasslands, etc.). Selected surrogate species and targets were used as the basis for regional conservation planning efforts within watershed landscape or geographic area. It was a practical step in implementing the SHC approach, using the best available science to conserve landscapes supporting multiple species. The surrogate species approach informed our agency's management practices and systems, and enabled the Service to make smarter, more cost-effective conservation and management decisions and propose investments in this LPP. Most importantly, it improved our ability to work with partners to sustain abundant, diverse, and healthy populations of fish, wildlife and plants now and in the future in the watershed and as an agency (<http://www.fws.gov/landscape-conservation/selecting-species.html>; accessed March 2014.)

The NALCC was one of the first LCC partnerships in the country to initiate the process to identify and select surrogate species. This partnership uses the term "representative" species in place of surrogate species.

Representative (e.g. Surrogate) Species Selection

The NALCC has designated an initial set of representative species as a tool for strategically conserving habitat at landscape scales (http://www.fws.gov/northeast/science/representative_species.html). In 2011, the NALCC held workshops in each of its three sub-regions (northern New England and New York, southern New England and New York, and mid-Atlantic), where Service scientists and other experts selected a total of 87 terrestrial and wetland species to compile a NALCC representative species list. A subsequent effort identified 12 aquatic

representative species. Some, but not all of these species, were identified as highest priority in the 2009 NALCC operations plan. Of the 99 representative aquatic and terrestrial species, 34 occur in the watershed.

The large proportion of LCC priority species supported in the watershed is a reflection of the broad diversity of habitats present, including habitat that is vital to species that range from migratory fish to boreal forest obligates. The watershed is centrally located in the NALCC; and ranges in elevation from sea level to the highest elevation (6,288 feet) in New England. Using the list, representative species are paired with each of the priority habitats included in each of the CFAs. Further details are available in appendix A of the draft CCP/EIS. These species were used to help inform, focus, and evaluate the potential contributions of each CFA identified for habitat protection.

Relationship of Project to the Connecticut River Watershed Landscape Conservation Design (Connecticut River Watershed LCD) Pilot Project

The CCP core team has continuously worked collaboratively with the four states on identifying and refining the CFAs identified in this LPP proposal since the CCP planning process was initiated in 2006 using an array of information made available by the states and other partners. During 2014, the CCP team spent a considerable amount of time working with the four respective State fish and wildlife agencies to seek preliminary agreements on those boundaries. The Connecticut River Watershed LCD Pilot Project was launched in February 2014, with a final design released in May 2015. The project is now moving into its next phase of implementation. CCP core team members participated in the Connecticut River Watershed LCD project, and thus, were able to share information from the LPP process, as well as compare and integrate LCD project results into this LPP proposal.

What follows is an overview of the Connecticut River Watershed LCD. The project has been well-documented and can be further reviewed at: <http://northatlanticlcc.org/groups/connecticut-river-watershed-pilot> (accessed January 2015).

The LCD planning effort is being facilitated by the Service and supported by the NALCC. However, key to its success is the 30-member core team of conservation partners composed of Federal and State agencies and private organizations working at various scales in the watershed. As noted above, refuge staff have participated on the LCD core team, as has the leadership of the Friends of the Silvio O. Conte National Fish and Wildlife Refuge (Friends of Conte Refuge), an association of local to national conservation, education, and recreation organizations. Fundamentally, the Connecticut River Watershed LCD is a collaborative effort among partners to develop a strategic plan for the watershed that will sustain habitat for fish, wildlife, and plants within a working landscape, while also reliably providing clean water, storm protection, recreation and many other natural benefits that support people and communities. It is intended to guide collective conservation actions within the watershed and connect to broader regional conservation goals for conserving sustainable fish and wildlife populations and their habitat for people.

The LCD planning effort pioneers the use of new decision support tools and the best available science to set goals and measurable objectives for representative species of fish and wildlife (and supporting ecosystems). It also translates those goals and objectives into projections of the amount, type, and distribution of habitat needed to sustain species and habitats at those levels. Also distinctive is the fact that it integrates expectations for climate change, urban growth, and other land-use changes and pressures.

The LCD project's stated objectives are to:

- Establish common conservation goals and objectives for species and ecosystems in the watershed that are informed by watershed and regional priorities.
- Develop a strategic landscape design that prioritizes places, and identifies strategies and actions, necessary to meet and sustain those goals and objectives into the future.
- Deliver information, maps, and tools with design options at multiple scales (e.g. local, State, and Regional scales) and in formats needed by partners to guide conservation decisions and inform planning (e.g. town master plans, refuge CCPs, National Forest Plans, and State WAPs).
- Establish a process for conducting landscape conservation design that can be applied and adopted elsewhere in the region.

There are over 20 primary products from the LCD project that are available and will serve, either separately or combined with other products, as useful decision-support tools for strategic conservation design work in the watershed. One significant product is the identification of a terrestrial core-connector land conservation network for the watershed. The terrestrial core-connector network represents a synthesis of ecological information and is designed to provide strategic guidance for conserving natural areas, and the fish, wildlife, and other components of biodiversity that they support within the watershed. The terrestrial core areas are created from a combination of 14 representative species habitat capability indices, and a terrestrial ecosystem-based core area selection index that includes metrics for integrity and resiliency. This proposed LPP fully complements and supports the Connecticut River Watershed LCD terrestrial core-connector network. Attachment III provides an example of how some of the LCD products (e.g. ecological integrity selection index, a species habitat capability index, and the terrestrial core-connector network), overlap with proposed CFAs.

The Connecticut River Watershed LCD core team set a conservation target of including approximately 25 percent of the watershed (approximately 1.8 million acres) in terrestrial core areas. The core areas are delineated based on ecological criteria without consideration of their current conservation status. Approximately 25 percent of the watershed is already currently under some form of protection within the watershed; but, only half (50 percent) of these protected acres (~900,000 acres) fall within an LCD terrestrial core area boundary. Our project proposal would allow refuge lands to contribute another approximately 110,000 acres toward insuring that the terrestrial core areas are conserved.

We anticipate that the Connecticut River Watershed LCD products will stimulate discussion and facilitate strategic conservation decisions in the watershed as more people become aware of them. We will help raise awareness of these products as we distribute the Conte Refuge draft CCP/EIS for public review and comment. These products, which include modeling the effects of climate change, land use change, and other landscape considerations, will be valuable tools for informing Federal and State agency, and local community, land use decisions.

Relationship of Project to Refuge System's Urban Initiative

The 7.2 million-acre Connecticut River watershed includes about 396 communities, 2.4 million residents, and two large New England urban areas: Springfield, Massachusetts (153,552 residents) (2013 U.S. Census) and Hartford, Connecticut (124,893 residents). Springfield is the fourth largest urban area in New England; only Boston (#1), Worcester (#2), and Providence (#3) are larger.

The proximity of existing and proposed Conte Refuge lands to major urban centers, such as Springfield, Massachusetts and Hartford, Connecticut, presents tremendous opportunity to reach new audiences who do not necessarily know about the Service and Refuge System, and therefore are less likely to visit refuge lands. Map C.2 shows major urban areas within the watershed, their proximity to existing conserved lands, and their distribution along the mainstem of the Connecticut River and its major tributaries. Proposed CFAs in proximity to these urban centers include: the Fort River and Mill River CFAs in Massachusetts, and the Farmington River, Salmon Brook, Scantic River, Pyquag, Maromas, Salmon River, and Whalebone Cove CFAs in Connecticut. The ever-growing urban population will be a critical constituency to engage as we work to ensure that future Americans continue to care about conservation. Connecting with urban communities is a major initiative within the Refuge System (<http://www.Fws.Gov/urban/index.Php>; accessed January 2015). The goal of the Urban Wildlife Refuge Program is to engage urban communities as partners in wildlife conservation through collaborations both on and off Service lands.

Existing and proposed Conte Refuge lands are strategically situated to provide opportunities for urban residents to directly experience the outdoors through fishing, hunting, wildlife observation, photography, environmental education, interpretation, and other compatible outdoor recreational pursuits. In addition, the Conte Refuge's existing and potential partnerships that operate in the urban environment are many and diverse. These partnerships include the Friends of Conte Refuge, Springfield Museums, Springfield Public Schools, City of Springfield, Re-green Springfield, Connecticut River Watershed Council, and Federal and state agencies. The refuge would also support urban education programs through implementing established programs such as Adopt-A-Habitat, Conte Corners, the Watershed on Wheels (WoW Express), Youth Conservation Corps, Student Conservation Association crews, and volunteers.

It is through opportunities like these on and off refuge lands that people will establish a relationship with nature, learn about our agency's important role in conservation, become citizen stewards, and garner an appreciation of the importance of sustainable conservation action in providing ecosystem and community

services such as the quantity and quality of water and open space. As a result, many people become inspired to help protect and nurture public lands as citizen stewards.

IV. Threats to Watershed Resources and How This Proposal Addresses Them

Potential Threats to Resources

The threats to America's land, water, fish and wildlife, and cultural resources are greater than any one agency or organization can address alone. Threats such as land use change, a changing climate, and invasive species have the potential to affect multiple species and resources across an entire landscape. These stressors are amplified by habitat fragmentation, loss of wetlands, and reduced water quality, quantity, flows, and impaired function, posing ever greater challenges and threats to the quality, connectivity, and sustainability of watershed resources.

Climate Change

As the climate changes, the impact affects the full spectrum of habitats due to changes in temperature, precipitation, and water level (increases and decreases). While the timing, extent, and location of these changes are not known, investments in land conservation that facilitate appropriate habitat connectivity (aquatic and terrestrial) in area (size), elevation, and latitude could help temper the impact, giving our Federal trust resources more opportunity to emigrate and the time to adjust and adapt. This proposal, along with existing and planned partner actions, would strive to assemble larger, better connected, more resilient, and redundant areas within the conservation estate that would afford ideal opportunities to evaluate, address, and employ adaptive management over time to temper the impacts of future climatic challenges on our Federal trust resources.

Land Use Change and Habitat Fragmentation

The river has been impacted by changes in land use, especially over the last 150 years. Changes in technology have dramatically changed farming, forestry, and real estate development while generational succession of landowners and the settlement of estates and the related impacts on parcel size and ownership pattern has changed the configuration of land use and management. Habitat fragmentation is typically preceded by ownership fragmentation. Ownership fragmentation in the watershed continues to increase as does the threat of development (commercial and residential). When the individual ownerships decline in size, and the purchase prices of smaller ownerships are reduced commensurately, the land becomes more available to a wider spectrum of potential buyers. As property changes hands or moves from one generation to the next, ownerships begin to fragment and become smaller. As ownerships become smaller, they are potentially more susceptible to conversion for development or other uses. A major focus of this proposal is to protect and assemble larger contiguous habitats within the existing watershed land conservation mosaic along latitudinal and elevation gradients in an effort to counter ownership and habitat fragmentation. This approach also accrues benefits to our desired outcomes for diversity and connectivity in area, aspect, process, and substrate that is well connected to a well-represented, redundant, and resilient core conservation network.

Impacts to Water Quality and Quantity and Wetlands

Refuge staff have been working with the Service's Fisheries program, the NALCC, and other Federal and State agencies and private organizations to evaluate impediments to the functioning of natural hydrologic systems in the watershed. Our focus has been on determining which impediments have the greatest effect on wildlife and aquatic species movement, water quality and quantity, duration and timing of flooding, and the health and integrity of wetlands. We are working with partners to identify and prioritize areas of greatest impact and to develop an implementation strategy to improve water quality and quantity, and the timing and duration of flow. With our partners, we have started working with local jurisdictions to identify opportunities for funding from the Department of Transportation (public land) and Department of Agriculture (private land) to improve road crossings, and the management of storm water and dams.

Protection of wetlands, floodplain forest, and riparian habitat is a major emphasis of this proposal. Restoring and maintaining the integrity of wetlands and other waters is one of the purposes in the Conte Refuge Act. We are also working with our partners to identify floodplains and wetlands that are a priority for protection and as feasible, the restoration of the structure and function of the floodplain forest and wetland complex.

Invasive Species

Controlling invasive species is a major focus of current refuge management programs. Today, many communities are faced with threats from exotic species such as Japanese knotweed, oriental bittersweet, garlic

mustard, water chestnut, purple loosestrife, Asian long-horned beetle and others. Our ability to effectively limit the impacts of these invaders is partially dependent on large-scale, intact, and resilient landscapes, such as those in our refuge proposal, which can be more resistant to new infestations when addressed at the CPA level.

How Project Proposal Addresses Threats from Climate and Land Use Change

When the refuge was authorized in 1995, the projected impacts of climate and land use change were not understood as they are today. Models to predict climate and land use changes have greatly improved in recent years. Today, we have more information and more sophisticated decision support tools to identify priority areas for protection to respond and better prepare for those changes.

This LPP, in conjunction with the land protection, restoration, and management programs of our partners working in the watershed, promotes the biological diversity, integrity, and resiliency of upland and wetland ecosystems in an amount and distribution that contributes to sustaining ecological function, supports healthy populations of native fish and wildlife, and anticipates the effects of climate and land use changes.

As noted previously, we used data and outputs from the Connecticut River Watershed LCD, TNC, State fish and wildlife agencies and other conservation partners, agency personnel expertise, and a myriad of other data sets to identify, compare, and contrast the CFAs with the highest quality habitat and the most intact, integral, and resilient places in the landscape. The proposed CFAs, in conjunction with the conserved lands network, will help conserve a resilient and integral landscape, and fortify the full spectrum of physical characteristics, to support species diversity in the face of anticipated climate and land use changes.

Connectivity of Protected Habitats

On a landscape scale, the diversity in substrate and topography (elevation and aspect), and the range in latitude, within the watershed allow for diverse, strategic, and sustainable connections between the Long Island Sound, White Mountains, Green Mountains, and the Northern Forest. These connections will increase opportunities for species migration and adaptation in response to climate change. For example, connecting and protecting floodplain forest and riparian areas, and efforts to reestablish a more natural flow of water within the watershed, which are all a priority in this proposal, will minimize the anticipated impacts from more frequent and intense flood events expected from climate change.

The CFAs along the mainstem in the lower reaches of the watershed are vital to the landward migration of the tidally influenced coastal wetland complex due to anticipated increases in sea level attributed to climate change. The lower portion of the river is not obstructed until the first dam in Holyoke, Massachusetts, a point that is well above the head-of-tide which is presently near Hartford, Connecticut. As the sea level rises, the fortunate absence of mainstem dams could allow the existing tidally influenced coastal wetland complex (salt, brackish, and fresh) to “migrate” upriver over time, provided the appropriate lands have been protected.

Habitat Resiliency

The term “resilience” refers to the capacity of a site to remain viable and adapt to climate change while still maintaining diversity, but does not assume that the species currently located at these sites will necessarily be the same species present in a century or two (<https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx>; accessed March 2013). Instead, if the land is conserved, the area will support species that thrive in the conditions defined by the physical setting. The CFAs, in conjunction with other conserved lands in the watershed, would conserve a spectrum of physical settings that are connected in latitude, elevation, aspect, and substrate, thus providing a gradient of exposure, temperature, and moisture. This diversity will help increase resiliency within the landscape, in part, by supporting a wide variety of microclimates. Furthermore, a well-distributed conserved lands network, reducing barriers and minimizing fragmentation, would promote resilience by facilitating range shifts and the reorganization of ecological communities.

V. Partnerships Important for Project Design and Implementation

Established Partnership Framework

The Northeast Region is a large and populous region with diverse opinions, backgrounds, and politics. While the 13 States in the Region account for about 7 percent of our Nation’s land base, it is home to about 25 percent of our Nation’s population. Much has changed since the refuge was authorized in 1995. At that time, there was widespread skepticism about the value of Federal government involvement in the watershed. Based on our

refuge partnerships, demonstrated actions, and shared outcomes, our relationship with the area communities, State agencies, and congressional delegations in the four States has strengthened over the past 15 years.

This proposal would further enhance the Service's collaborative, landscape-scale, partner-driven approach in the watershed and complements the vision which led to the passage of the Conte Refuge Act in 1991. As proposed, an expanded and strategic refuge design offers the opportunity to demonstrate the integrated implementation of SHC and adaptive management in a partnership approach to support the NAWMP/ACJV, endangered species recovery plans, BCR priorities, and habitats identified by the NALCC within a large watershed and landscape-based conservation mosaic. Further, it provides a framework and a forum for engaging multiple Federal agencies, State agencies, local municipalities, private organizations, interested landowners, and individual citizens in conservation, education, recreation, and sustainable and complementary economic efforts. Goal 4 in the draft CCP/EIS details how the refuge would continue to initiate, support, and promote partnerships with other Federal, State, and local governments, Tribal governments, and private individuals and organizations

Specifically, our partnership goals with this LPP include the following:

- Conserving and protecting an array of terrestrial and aquatic habitats that support federally listed threatened or endangered species, waterfowl and other migratory birds as described in Service, State, and partner-supported plans;
- Monitoring and addressing socio-cultural values of interest to local communities, in particular, ecosystem services, as well as resource impacts associated with climate and land use changes;
- Providing opportunities to demonstrate adaptive land management techniques in response to landscape changes, and support those activities on partner and private lands;
- Seeking opportunities for partners to combine their strengths to make important contributions to conservation, and to link exceptional wildlife and public use values within reach of one of the most highly populated regions in the country; and
- Providing opportunities to connect people with nature in rural to urban settings by protecting public access and offering compatible programs to engage and motivate people to learn about and enjoy nature and act to conserve it.

While the Service contribution of conserving approximately 197,296 acres may only represent less than 3 percent of the 7.2 million-acre watershed, and about 10 percent of the existing conservation estate (1.8 million acres +/-), when added to the existing public and private conservation accomplishments, the benefits accrued to targeted trust resources and the overarching watershed partnership will be considerably greater. Decades of work to promote partnerships for wildlife habitat, outdoor recreation, working forest and farms, and leveraging these programs, has magnified the potential beneficial impact in the watershed. Approval of this proposal would expand the impact of the Service to accomplish those benefits working with conservation partners, landowners, and other stakeholders in the watershed.

A notable successful partnership is the Friends of Conte Refuge which is best described as an association of approximately 70 conservation, recreation, education, and organizations and public agencies. Over the past decade, the group has increased in representation, scope, and sophistication, and now works well beyond what is considered a traditional refuge boundary. The Friends Group strives to provide a foundation, forum, and framework to establish and facilitate diverse and creative partnerships that promote conservation, education, recreation, and economic opportunities within the watershed. Their successes and influences on conservation in the watershed are noteworthy and have drawn national attention (<https://www.facebook.com/pages/Friends-of-the-Silvio-O-Conte-National-Fish-and-Wildlife-Refuge/121976791147545?fref=nf>; accessed March 2015).

NALCC Partnership

Refuge lands will play a vital role in implementing the conservation actions identified by the NALCC partnership. This partnership includes the Service, other Federal agencies, States, Tribal governments, universities, and private organizations. The NALCC Development and Operations Plan details this partnership and identifies the plan's priorities (<http://www.fws.gov/northeast/science/pdf/NorthAtlanticLCCfinal.pdf>; accessed May 2014).

Implementation of the Connecticut River LCD Pilot Project, previously described, will also be a priority for the NALCC.

Other Federal Agencies

The refuge has several memorandums of understanding (MOU's) with other Federal agencies engaged in conservation in the watershed. The 2012 MOU establishing the watershed as a large landscape demonstration project under the Presidential initiative "America's Great Outdoors" includes nine Federal agencies: NRCS, U.S. Forest Service, Farm Service and Rural Development agency, DOT, NOAA, Department of Housing and Urban Development, EPA, and U.S. Army Corps of Engineers. The draft CCP/EIS, including this LPP, proposes to utilize the America's Great Outdoors framework to catalyze and bolster Federal agency partnerships to align, target, and leverage public resources to accomplish shared goals and objectives in the watershed.

State Wildlife Agencies

The Service and the four State fish and wildlife agencies in the watershed already work collaboratively to benefit many species and habitats. This proposal would support priorities for habitat protection and management in State WAPs and the outcomes and benefitting State WAP species are tracked and listed in CFA specific table in Attachment I. Species of greatest conservation need (GCN) have been identified in each of the four State plans: Connecticut (Connecticut Department of Environmental Protection Bureau of Natural Resources (CTDEEP) 2005), Massachusetts (Massachusetts Department of Fish and Game 2006), Vermont (Vermont Fish and Wildlife Department 2005), and New Hampshire (New Hampshire Game and Fish Department 2005). Almost without exception, the GCN species include those identified by the Service and are recognized by regional conservation partnerships (e.g., Joint Ventures) as priority resources of concern.

Tribal Governments

Native American Tribal Governments are important partners in the watershed. We will continue to pursue timely and effective collaboration in developing the CCP and protecting Native American cultural resources. Early in developing the Conte Refuge draft CCP/EIS, we contacted federally recognized Tribal governments with associations in the watershed to discuss issues, concerns, or opportunities they may have with existing or proposed refuge management. We also shared an internal review draft of the CCP/EIS. No issues or concerns related to land acquisition were expressed. The following Tribes were contacted:

- Narraganset Indian Tribe
- Mohegan Tribe of Indians of Connecticut
- Mashantucket Pequot Tribal Nation
- Wampanoag Tribe of Gay Head (Aquinnah)
- Mashpee-Wampanoag Tribe
- Stockbridge-Munsee Band of Mohican Indians

We will continue to engage and consult with Tribes throughout the planning and implementation phases of this project.

Private-Public Conserved Lands Network in the Watershed

As noted, the watershed has an extensive network of publically and privately conserved lands, totaling just over 1.8 million acres or 25 percent of the watershed. Conserved or "secured" lands in the watershed are lands that are permanently protected from development through fee title or easement restrictions, but in some cases may allow certain other land uses, such as farming and forestry. The conserved lands network is important to highlight because refuge lands are included, and because we have significant partnerships with other conservation land owners, especially those in proximity to refuge lands.

Within the watershed, many agencies, organizations, and private individuals own and maintain land included in the conserved lands network for a variety of different primary purposes. Those include: water supply, flood protection, timber production, agricultural use, recreational use, and fish and wildlife habitat. Some owners place a restriction on development simply for aesthetic reasons.

Table 8 presents the estimated conserved acres by state. It is important to note that there are likely small parcels held by municipalities, small land trusts, or private landowners that are not in the secured lands database yet, and more are being added all the time. While 25 percent of the watershed benefits from some form of conservation status; approximately half of these acres are situated in the desired system of

connected core areas that are more functionally resilient to the anticipated changes in climate and land use (attachment III).

Table C.7. Conserved Lands in the Connecticut River Watershed by State

	Connecticut	Massachusetts	Vermont	New Hampshire	Totals
Federal	428	11,149	215,699	238,173	465,450
State	78,407	345,013	172,236	150,742	746,399
Local ¹	42,820	78,478	26,398	48,898	196,595
Private	39,199	48,860	179,467	214,182	481,710
Unknown ²	2,502	6,468	0	0	8,970
Totals	163,357	489,970	593,802	651,996	1,899,126

Sources: *CTDEEP Natural Resources Center (CT); Midstate Regional Planning Agency (CT); University of New Haven (CT); TNC (CT); MassGIS (MA); NH GRANIT (NH); Vermont Center for Geographic Information (VCGI) (VT); South Windsor Regional Planning Commission (VT); Northeastern Vermont Development Association; and the U.S. Fish and Wildlife Service.*

¹ This includes city and town water supplies.

² This could not be determined from the data available.

VI. Implementing the Proposed Land Protection Strategy

Service Land Acquisition Policy

It is the Service's policy and long standing practice to work with only willing sellers to acquire the minimum interest necessary to achieve our objectives. The Service's interest purchased can include fee-title or less-than-fee-title interest (e.g. easements and leases), and would be at market value. This approach has been modeled at the refuge over the past 15 years. A variety of different strategies were employed (fee title, easement, and use (term and life) reservations) to meet the resource protection objectives of the refuge in a manner that met the individual needs and preferences of the landowner.

The Service purchases land from willing sellers at market value, over time, as lands become available and only when funds are available and there is an agreement in terms and prices. Landowners are under no obligation to sell an interest in their properties to the Service, or change their practices or plans for their property due to location within an approved refuge acquisition boundary. In addition, owning land within an approved refuge acquisition area does not affect how the property owner can use their land or impact who the owner can sell their property to. In essence, defining the Service's areas of interest (e.g. a proposed CFA) authorizes the Service to be a "willing buyer" and an option to the landowner. The Service would strive to minimize the acquisition of infrastructure, unless the property is desirable for restoration purposes or is consistent with meeting other refuge goals or objectives.

Prioritizing Parcels for Acquisition Within Proposed CFAs

Our acquisition activities will be informed and guided using priority rankings we have assigned them in this LPP. We evaluated and prioritized approximately 5,000 parcels within 21 proposed CFAs (Quonaturck CFA not included), and arranged the parcels into three priority categories or "tiers": Tier I, Tier II, and Tier III, with Tier I being the highest priority. Individual parcels range in size from about 1 acre to approximately 3,600 acres. In order to establish the tiered ranking system, we considered three criteria which we describe further below: the amount of priority species habitat within each parcel, the amount of wetlands, and the parcel size.

Priority Habitat

We first identified the three highest priority habitat types in each CFA based on the habitat's contribution to priority refuge resources of concern (draft CCP/EIS appendix A; also, see also table C.8). Below we present the considerations we used to prioritize areas and parcels for acquisition in this proposal. Our priorities were based on the following general considerations:

- Presence of suitable habitat for threatened and endangered species.
- Presence of suitable habitat for migratory birds in decline.
- Presence of important waterfowl habitat as identified by the ACJV.

Additional considerations include:

- Presence and amount of habitat for other species of conservation concern.
- Presence of riparian and floodplain forest.
- Connectivity in area, elevation, latitude, aspect, substrate, and process.
- Level of development, including buildings, roads, and other infrastructure.

These tiers will be primarily used if multiple landowners offer parcels of land in the proposed acquisition areas at the same time, and funding is insufficient to purchase all available parcels.

In order to establish the tier ranking by parcel, we considered three criteria: (1) amount of priority habitats; (2) presence of wetlands; and, (3) size of parcel.

Table C.8. Priority I, II, and III Habitats in Each Proposed CFA

CFA	Priority I Habitats	Priority II Habitats	Priority III Habitats
Whalebone Cove CFA, Connecticut (3,786 acres)	Freshwater Marsh	Hardwood Forest	Shrub swamp and Floodplain Forest
Scantic River CFA, Connecticut (4,128 acres)	Floodplain Forest	Hardwood Swamp	Freshwater Marsh and Shrub Swamp
Salmon River CFA, Connecticut (3,699 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Salmon Brook CFA, Connecticut (2,770 acres)	Floodplain Forest (currently agriculture)	Grassland (currently agriculture)	Hardwood Swamp
Pyquag CFA, Connecticut (2,956 acres)	Floodplain Forest (currently agriculture)	Hardwood Swamp	Freshwater Marsh
Maromas CFA, Connecticut (3,935 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Pasture/Hay/Grassland
Farmington River CFA, Connecticut and Massachusetts (8,866 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Westfield River CFA, Massachusetts (6,520 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp
Mill River CFA, Massachusetts (2,359 acres)	Floodplain Forest	Hardwood Swamp	Freshwater Marsh
Fort River CFA, Massachusetts (1,662 acres)	Floodplain Forest	Grassland	Hardwood Forest
Dead Branch CFA, Massachusetts (6,012 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Sprague Brook CFA, New Hampshire (3,016 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Pondicherry CFA, New Hampshire (10,242 acres)	Spruce-fir Forest	Peatland	Shrub Swamp and Floodplain Forest
Mascoma River CFA, New Hampshire (20,601 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp
Blueberry Swamp CFA, New Hampshire (4,754 acres)	Spruce-fir Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp

CFA	Priority I Habitats	Priority II Habitats	Priority III Habitats
Ashuelot River CFA, New Hampshire (17,753 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
White River CFA, Vermont (10,031 acres)	Hardwood Forest	Pasture/Hay/Grassland	Cliff and Talus
West River CFA, Vermont (22,020 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Ottawaquechee River CFA, Vermont (5,985 acres)	Hardwood Forest	Pasture/Hay/Grassland	Cliff and Talus
Ompompanoosuc River CFA, Vermont (15,071 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Pasture/Hay/Grassland
Nulhegan Basin CFA, Vermont (32,541 acres)	Spruce-fir	Shrub Swamp and Floodplain Forest	Peatland
Quonotuck CFA, Connecticut, Massachusetts, Vermont, and New Hampshire (8,000 acres)	Floodplain Forest	Tidal Marsh	Hardwood Swamp and Shrub Swamp

Priority Habitats

We assessed each individual parcel within each CFA to determine how much of the parcel contains the priority habitats for the species of conservation concern identified for that CFA. We categorized parcels containing at least 67 percent priority habitats as “important habitat parcels.” However, we were concerned that these criteria might not capture some larger parcels that still support significant amounts of priority habitat, but do not meet the 67 percent threshold. Therefore, we also categorized parcels that included at least 3 percent of all priority habitat for a particular CFA as “important habitat parcels³.”

Wetlands

We next used National Wetlands Inventory data and USGS data to map wetlands, rivers, and streams, and then buffered each by 100 feet. Any parcel that contained at least 3 acres of buffered water and/or 3 acres of buffered wetland was categorized as an “important water parcel.” Within the watershed, wetlands only account for 3 percent and open water only 2 percent of the habitat. Therefore, it is important to adequately protect these elements of the conservation mosaic in a manner that assures wetland and water quality and quantity for the benefit of wildlife and people.

Parcel Size

We used professional judgment to establish 5 acres as meaningful threshold on which to rank individual parcels. It is based on our experience that areas less than 5 acres, by themselves, can be challenging for effectively protecting, managing, or connecting habitat patches. A parcel is ranked lower if it is smaller than 5 acres.

Determination of Tier I, II, or III rank

Using the three criteria of habitat, wetlands, and parcel size, we then assigned a priority, or tier ranking, to each parcel. Tier I (highest priority) was assigned to parcels that were found to be important on all three criteria. Tier II was assigned parcels were important in two of the three criteria. Tier III was assigned to parcels important in one of the criteria. Table 9 below illustrates the assignment logic. An example of a parcel map for a CFA, and the respective parcel tier assignments that we are recommending, is presented in attachment II (map CII.1; table CII.1). CFA parcel maps and tier assignments for the approximately 5,000 parcels that comprise the full project are posted on our Website at http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.

³ For example, assume a 10,000-acre CFA contains 7,000 acres of the three highest priority habitat types. Two of the parcels in this CFA are parcels A and B. Parcel A is 20 acres in size with 15 acres of priority habitat. This means that 75 percent of this parcel is priority habitat. Parcel A is an important habitat parcel because more than 67 percent of the parcel is priority habitat. Parcel B is 1,000 acres with 500 acres of priority habitat. This means that only 50 percent of this parcel is priority habitat and it does not meet the 67 percent threshold. However, Parcel B is also an important habitat parcel because it contains more than 3 percent of the priority habitat in the entire CFA (3 percent of 7,000 acres is 210 acres).

Table C.9. Criteria Used to Establish Tier Designation for Each Parcel Proposed for Acquisition in Project

Important Habitat in Parcel¹	Important Water or Wetlands in Parcel²	Parcel Size > 5 acres	Tier Designation for a Parcel
Yes	Yes	Yes	I
No	Yes	Yes	II
Yes	No	Yes	II
Yes	Yes	No	II
No	No	Yes	III
No	Yes	No	III
Yes	No	No	III

¹ *Important Habitat Parcel: Any parcel that contains at least 67 percent of a priority CFA habitat type (re: table C.7), or that contains more than three percent of all priority habitat for a particular CFA.*

² *Important Water or Wetlands Parcel: Any parcel that contains at least three acres of water, including 100-foot buffer, and/or that contains three acres of wetlands, including 100-foot buffer.*

In addition to the priority criteria identified above, these other factors will also influence acquisition decisions:

- Availability of willing sellers.
- Availability of funding.
- Presence of infrastructure.
- Landowner needs.
- Operational efficiencies.
- Unforeseen site characteristics.
- Updated resource information and increased scientific knowledge.
- Proximity and connection to other conserved lands.
- Changes in habitat and other ecological conditions.
- Conservation status: we do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances.
- Presence of rare species and/or rare/imperiled habitat communities.
- Tangible threats to resources of concern.

The Service reserves the right to be flexible with the tier group rankings detailed above because, adhering to SHC principles, the identification and evaluation process is dynamic and must be adaptive to new or changing conditions. Smaller parcels, and parcels with significant improvements, development, and/or other alterations, will generally be eliminated from future consideration, unless protection is necessary to achieve restoration and management objectives within the surrounding landscape. In addition, the Service may need flexibility to meet the needs of individual landowners.

Description of Land Protection Options Considered for Project

The following land protection options were considered as we developed our project proposal:

- Option 1: Landowner retains ownership and all use of property.
- Option 2: Management and/or land protection measures by others.

- Option 3: Less-than-fee-title acquisition (easement, lease, management agreement) by the Service.
- Option 4: Fee-title acquisition by the Service.

Option 1: Landowner Retains Ownership

Landowners who do not wish to convey their lands to the Service or another conservation entity may still like to improve their lands for wildlife. We may provide technical expertise or inform the landowner of voluntary incentive based programs offered by the Service or its partners to assist in habitat conservation. Landowners within a CPA or CFA would not be subject to any additional obligation or regulation due to their property's location within a proposed CPA or CFA.

Option 2: Management and/or Land Protection by Others

About 25 percent of the watershed is already under the stewardship of conservation partners via fee title, easement, leases, and/or management agreements. This option includes the diverse menu of partner initiatives that are intended to keep working farms and forests, restore wetlands and wildlife habitat, and promote and employ best management practices for land stewardship.

The U.S. Department of Agriculture has a very active easement program for private landowners in the watershed, historically offering the Forest Legacy Program (FLP), Farm and Ranchland Protection Program (FRPP), and the Wetland Reserve Enhancement (WRE) Program. USDA easement programs are diverse and typically well-funded, when compared to the Service's traditional land protection funding sources. For example, if a willing seller within a CFA would like to protect their forest as a working forest and manage it to produce lumber and to allow public access; the FLP may be the best option. If another willing seller who owns a farm that has residential development capacity reflected in the tax assessment, and they want to keep it as a working farm, an FRPP easement with USDA may be the best option.

We would promote the use of these USDA programs, as well as other Federal and State agency land conservation programs, across the watershed to support achieving Conte Refuge's legislated purposes, especially within CPAs and CFAs. Each of these voluntary and incentive based programs, and similar State and locally based conservation alternatives, are important conservation strategies to promote an integrated and sustainable working landscape. Management and protection of land and related resources by others will continue to add to the conserved lands network. This proposal could enhance the availability of watershed protection efforts by expanding the options available to the landowner, rather than compete or duplicate existing partner initiatives.

Option 3: Easements, Leases, and/or Management Agreements obtained by the Service

This option allows the Service to acquire a partial interest in lands through use of tools such as easements, leases, or cooperative agreements. This option employs long-term or permanent easements, renewable leases, and/or management agreements as a means of protecting and managing land to benefit fish and wildlife, and possibly providing wildlife-dependent recreational and educational opportunities. To date, the Service more frequently uses conservation easements, but short-term leases or management agreements have also been used effectively to protect or manage habitat on a temporary basis.

Specifically, conservation easements convey a partial, typically permanent, interest in land to the Service. Easement interests are acquired by the Service at market value from willing sellers to accomplish the purposes of the refuge. The underlying fee title to the property is retained by the landowner, leaving the parcel in private ownership. The Service and landowner agree to land-use practices that enable both to meet their conservation goals, as well as provide the landowner continued stewardship and use of these lands.

The Service would negotiate, on a case-by-case basis, the extent of the rights to acquire. Those may vary, depending on the configuration and location of the parcel, the current extent of development, habitat management requirements, the needs of the landowner, and other considerations. The structure of such easements will provide permanent protection of existing wildlife habitat while also allowing habitat management or improvements and access to sensitive habitats, such as for endangered species or migratory birds.

Where consistent with our management interests, we may also seek to acquire public access rights to secure wildlife-dependent recreational opportunities. However, the conveyance of any interest in land to the Service is up to the landowner. Easements are best employed by the Service as a conservation measure when:

- Only minimal management of the resource is needed, but there is a desire to ensure the continuation of current sustainable uses, wildlife habitat conditions, public access, and to prevent fragmentation over the long term.
- A landowner is interested in maintaining ownership of the land, does not want it to be further altered, and would like to realize the benefits of selling management rights, and/or public access rights.
- Properties subject to easements generally remain on the tax rolls, although the change in market value may reduce the assessment and ultimately the amount of property tax liability for the landowner. The Service does not pay refuge revenue sharing (i.e., funds the Service pays to counties and municipalities in lieu of taxes) on easement rights.

Other less-than-fee options include cooperative management agreements or leases, which convey management rights on a temporary basis. Similar to an easement, a lease represents an interest in the real estate for a specific period of time. Service easements are typically perpetual, while leases are temporary. The Code of Federal Regulations (CFR) can apply when the Service acquires interests in land via leases, similar to lands acquired in fee title or easement. For example, we could post the property and protect it as a national wildlife refuge for the duration of the lease, provided the appropriate clause was agreed to by the landowner (lessor) who is granting the lease.

Option 4: Fee Title Acquisition by the Service

This option includes the Service acquiring a full, fee title interest in land. A fee-title interest is normally acquired when: (1) the area's fish and wildlife resources require permanent protection not otherwise assured; (2) land is needed for visitor use development; (3) a pending land-use change may adversely impact the area's resources; (4) it is the most practical and economical way to assemble tracts into a manageable unit; or, (5) the landowner is not interested in retaining any interest in the property. Fee-title acquisition conveys all ownership rights to the Federal Government and provides the best assurances of permanent resource protection. A fee-title interest may be acquired by donation, transfer, or purchase when funds are available. We also have the authority to exchange land in Service ownership for other land that has greater habitat and/or wildlife value. Inherent in the land exchange option is the requirement to get dollar-for-dollar land value with, occasionally, an equalization payment. Exchanges are attractive because they usually do not increase Federal land holdings or require purchase funds. However, they also may be very complicated and take time to complete.

The fee title acquisition option provides us the most flexibility in managing priority lands, and ensuring perpetual protection of nationally significant trust resources and their habitat, and providing opportunities to engage the public through wildlife-dependent recreation and education opportunities. Generally, the lands the Service acquires will require some active management, including controlling invasive species, mowing or prescribed burning, planting, or managing for the compatible, priority public uses. In some cases, we may acquire fee interest on lands encumbered with a conservation easement, such as when an owner is interested in selling the remainder of interest in the land on which the Service or other partners have acquired an easement. We evaluate this need on a case-by-case basis and often in consultation with our partners, provided the landowner is agreeable to involving of others and the sharing of relevant or private details involved in the negotiations between the Service and the landowner.

Land Protection Options Recommended for this Project

Our proposal includes a combination of Options 1, 2, 3, and 4. We believe this approach provides a range of flexible and cost-effective methods of implementing Service policy, while offering alternatives responsive to the preferences of local landowners interested in contributing to conservation, but who may or may not want to sell a full interest in their lands. We would also consider a donation as the opportunity arises, but this is difficult to anticipate and is not planned as part of our proposal.

A concerted effort will be made to acquire approximately 65 percent of the entire refuge in fee and the remaining 35 percent via easements, or other less-than-fee options. To date, fee title acquisition from willing sellers has been the Service's principal method of ensuring permanent protection of high priority habitats within refuge boundaries. However, we are finding that conservation easements are becoming more popular and appreciated by landowners who wish to conserve their properties, receive some financial benefits, and keep the land in traditional uses. To that end, and given the unique legislative mandate for this refuge, we

will emphasize the use of wildlife conservation easements for habitat management and/or public access for compatible outdoor recreation as an important tool of our land protection strategy.

Ultimately, it is the landowner who will determine what, when, or even if, land is purchased to become refuge. With available funding and an agreement in terms and price between the Service and the owner, land can be protected. The actual configuration of the purchase could include the whole parcel, a subdivision of the parcel, or only a portion of the ownership. Final action will be based on mutual agreement as to the type of protection strategy (fee or easement) employed. It is for these reasons and more, we estimate that an average of approximately 90 percent of the land identified within the CFAs will be conserved.

Further, should another Federal or State agency or organization administer a program that is more compatible with the desires of the landowner, the Service will strive to connect the landowner to those opportunities. Examples include the FLP and FRLP programs, and other easement, lease, and voluntary and incentive based protection options. This approach will be better for the landowner and allow the Service to expend its limited funds to protect lands that are most aligned with our Strategic Growth policy.

Once the landowner preference is identified and a description of what may be conveyed to the Service is described, an appraisal that meets stringent Federal requirements will be conducted. Willing-seller landowners interested in selling fee title ownership, easement, or sell a lease to the Service, and who give written permission, will initiate our process to work with the Department of the Interior's Office of Valuation Service to conduct, review, and approve an appraisal to determine market value. Once an appraisal has been approved, we can present an offer for the landowner's consideration. The Service is required by Federal law to offer 100 percent of the appraised market value or the interest in the property being conveyed; however, we can accept landowner offers of selling for less than the appraised value.

VII. Project Costs and Funding

As of October 2013, approximately \$31.4 million has been used to purchase the current 35,921 acres of refuge lands. These funds were used to pay for direct land costs, plus incidental real estate expenses to cover appraisals, surveys, title work, and relocation expenses; resulting in an average \$872 per acre acquisition cost since the refuge was first established on October 3, 1997.

Using the previous per acre value, the proposed 99,916-acre refuge increase could increase the project cost by approximately \$87.1 million. Based on our financial capacity over the past fifteen years, it could take another 50 years to acquire the entire project. A long-term commitment of this nature is not at all uncommon when compared to the status of other Refuge System land protection projects, and in light of our willing-seller-only approach.

The legislated purposes in the Conte Refuge Act create both an opportunity and a justification for other Federal agencies to participate and leverage their human and financial resources within a partnership context, and in support of mutually-beneficial programmatic and landscape agency goals. These resources could be focused on public or private land within a CPA or CFA, and augment the efforts and accomplishments by the Service and many other partners.

There are many sources of funding that could be pursued to achieve conservation objectives and outcomes that contribute toward the refuge's legislated purposes. Sources of land conservation funding could be derived from: Land and Water Conservation Fund, Migratory Bird Conservation Fund, North American Wetlands Conservation Fund, State Wildlife Grants, FLP and FRPP funds, WRE, and State conservation dollars. In addition, habitat restoration could be accomplished using: Partners for Fish and Wildlife Funds, Habitat Recovery Grants, State Wildlife Grants, Wildlife Habitat Incentive Program, Environment Quality Investment Program, and Coastal Program Funds. Further, additional resource accomplishments could be realized using DOT funding and EPA funding. While many of these funding sources would not be applied toward our appropriation ceiling, they could stimulate vital resource accomplishments and decrease Service costs as well as many more options for the landowners.

VIII. Proposed Management Direction Under Service Ownership

Land Management Direction

Emphasis will be on promoting habitat that improves and sustains biological diversity, integrity, and ecological function within habitat communities listed below. Additional details are available by CFA in the refuge's draft CCP/EIS appendix A which details priority species, habitat targets (type and amount), and related management objectives and strategies. Below we present the general management objective for major habitat types which are outlined in more detail in the draft CCP/EIS appendix A.

Forested Upland and Wetland—Protect, manage, and/or restore forested acres within the watershed to assemble resilient forest blocks valuable to conservation targets (i.e. migratory birds of conservation concern).

Riparian Habitat and Floodplain Forest—Protect, manage, and/or restore priority riparian areas, including forested floodplains and river and stream banks to promote habitat connectivity, migration and emigration corridors, and water quality.

Shrub and Grassland—Protect, manage, and/or restore grasslands and shrublands, consistent with site capability, within the watershed to support early successional dependent migratory bird species and NEC.

Agricultural Land—Support the conservation and sustainable use of agricultural land within the watershed to reduce the permanent loss or degradation of current and potential wildlife habitat.

Non-forested Wetlands—Protect, manage, and/or restore non-forested wetlands, including shrub swamps, peatlands, herbaceous marshes, and wet meadows to benefit declining migratory birds.

Water Resources (Rivers, Streams, Lakes, and Ponds)—Protect and restore water quality and in-stream structure, function, and process within the river mainstem and its tributaries, and lakes and ponds to benefit aquatic species, including federally listed threatened and endangered species.

Tidal Wetlands and Adjoining Uplands (Salt, Brackish, and Fresh)—Protect, maintain, and restore tidally influenced wetlands in the watershed to benefit migrating and wintering waterfowl and other migratory bird species and allow for their landward migration due to climate change.

As land is acquired from willing sellers and becomes a manageable unit, CFA specific habitat management plans will be developed in consultation with the public, partners, and other stakeholders. Species and habitats will be managed to protect ecosystem structures and functions in an effort to provide viable habitat for wildlife in the face of climate and land use changes.

In appendix A, we also detail our general management direction for enhancing environmental, interpretive, and outreach programs and their delivery on refuge lands, while also continuing to expand opportunities off-refuge using the WoW Express, “Biological Assessment Trailer”, Adopt-a-Habitat program, “Conte Corners” and private lands program. In appendix A, we also emphasize our intent to continue robust hunting and fishing programs consistent with state regulations when deemed compatible, and to provide other outdoor recreational opportunities that provide quality, nature-based experiences, and which foster an appreciation for conserving natural resources and garner support for the Refuge System.

IX. Special Considerations

Conservation Plans and Initiatives Guiding Development of the LPP

This proposal will contribute to a variety of important ecoregional landscape plans and partnership initiatives that include the ACJV Implementation Plan and the Black Duck Joint Venture Strategic Plan of the NAWMP, the Northern Atlantic Regional Shorebird Plan, the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes Region, the BCR 14 and 30 Plans, and the State WAPs in Connecticut, Massachusetts, New Hampshire, and Vermont. In all, we consulted over 60 other plans to help develop the land protection actions outlined in this proposal. The myriad of plans confirms the importance of the watershed to many governmental and non-governmental conservation organizations. These plans range from watershed-wide conservation plans to species-specific recovery plans, representing all major taxa, both terrestrial and aquatic. They are summarized in appendix M of the refuge's Draft EIS/CCP.

International, National, Regional, and State Designations

Landscape conservation actions within the watershed date back to at least 1952 when the Connecticut River Watershed Council was created. Since that time, the watershed has been the subject of attention by many diverse agencies and organizations that recognize its significance as a landscape worth conserving. International, national, and state conservation and recreation designations recognize many attributes within the watershed for exceptional, high quality wildlife and fish habitat, as recreation destinations, for its working landscapes and many cultural and historic resources, including:

- The river and the watershed was designated by the Secretary of the Interior as the Nation's first, and only, National Blueway on May 24, 2012.
- The river was designated as an American Heritage River on July 30, 1998.
- The tidal wetlands complex in the vicinity of where the river meets the Long Island Sound was designated as a Ramsar Wetland of International Importance (under the Ramsar Convention) on October 14, 1994.
- Eleven areas with high quality habitat that are vital to birds and other biota are recognized by the National Audubon Society as Important Bird Areas (IBA). There is at least one IBA in each of the four States within the watershed. The refuge's Pondicherry and Nulhegan Basin Divisions include recognized IBAs.
- The river mainstem, from the Massachusetts stateline north to about Claremont, New Hampshire, is a NAWMP focus area and an IBA.
- Three areas in the watershed are designated as National Natural Landmarks, including a portion of the refuge's Pondicherry Division.
- The watershed is also a focus for the NALCC, the Northeast Region of the Service, and it is part of one of the five (5) large iconic landscapes identified by the Administration and a focus for the DOI, Department of Agriculture, and the Army Corps of Engineers.

X. Socioeconomic and Cultural Impacts

Socioeconomic Impacts

We do not predict significant adverse socioeconomic or cultural impacts as a result of this proposal or other components of the Service-preferred alternative C in the draft CCP/EIS. We anticipate there will be an overall positive effect on the socioeconomic environment as a result of the action outlined in this document. If the Service protects lands identified in this proposal over an extended period (decades) of time, we believe positive benefits for communities in the watershed will include: increased property values in the vicinity of the conserved properties, increased watershed protection, maintenance of many traditional uses, increased opportunities for outdoor public use activities, and increased revenues for local businesses from refuge visitors who participate in hunting, fishing, and wildlife observation. Recreational use on national wildlife refuges nationally generated almost \$2.4 billion in total economic activity during fiscal year 2011, according to the Service's *Banking on Nature 2013: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation* report (Carver and Caudill 2013).

According to the Banking on Nature study, nearly 46.5 million people visited national wildlife refuges in 2011, supporting almost 35,000 jobs and producing about \$793 million in employment income. In addition, recreational spending on refuges generated nearly \$343 million in tax revenue at the local, county, State, and Federal levels. An estimated 87 percent of refuge visitors travel from outside the local area (Carver and Caudill 2013).

The potential exists for some adverse impacts, namely a potential decline in tax revenue to local governments (as lands come under Service ownership). However, this decline may or may not occur, since those lost tax revenues will be offset partially by the Refuge Revenue Sharing (RRS) Program (<http://www.fws.gov/refuges/realty/rrs.html>; accessed May 2014). Funding of the RRS program will be dependent on future congressional appropriations.

For refuge CCP planning, we enlisted the assistance of economists with the USGS, Fort Collins Science Center, to assess the economic impact of the alternatives evaluated in the draft CCP/EIS, including this land protection proposal. The full report is included as appendix I of the draft CCP/EIS. Among other details and analysis, the report includes a description of the current economic setting and illustrates the refuge's economic contribution to local communities. The refuge management activities of greatest, direct economic impact in the watershed are:

- Refuge purchases of goods and services within the local communities.
- Refuge staff salary spending.
- Refuge visitor spending in the local communities.
- Revenues generated from timber harvesting for habitat management on the refuge.
- Refuge land purchases and changes in local tax revenue.

The USGS economic report focuses on describing and assessing six focal sub-regions within the watershed. The sub-regions incorporate 11 counties that make up the bulk of the watershed and are central to the refuge's existing and proposed future land base. The sub regions described are:

Northern Sub-Region: Essex County, Vermont, and Coos County, New Hampshire.

- White River Junction Sub-Region: Orange County, Vermont, Windsor County, Vermont, and Grafton County, New Hampshire.
- Tri-State Border Sub-Region: Windham County, Vermont, Cheshire County, New Hampshire, and Franklin County, Massachusetts.
- Greater Amherst Sub-Region: Hampshire County, Massachusetts.
- Greater Hartford Sub-Region: Hartford County, Connecticut.
- Southern Connecticut Sub-Region: Middlesex County, Connecticut.

Section 1 of the USGS report provides a description of the various regional economies and select local communities that comprise the watershed and specific management areas for the refuge. Section 2 is a qualitative discussion regarding the current and potential economic and fiscal impacts generated by the refuge from additional land acquisition. It also provides an in-depth discussion of ecosystem services and relative values in a qualitative manner, which we summarize below. Section 3 describes the methods used to conduct a regional economic impact analysis, followed by an analysis of the draft CCP/EIS management strategies that could affect the local economy.

The report quantifies current contributions of the refuge to regional economies, but emphasizes that the economic impacts from additional land acquisition are highly dependent on the timing, amount, and distribution of those acquisitions. With the high level of uncertainty, and the many variables at play, it is not possible to precisely predict the economic impacts from a refuge expansion thus they are presented qualitatively. The authors predict that over time, any possible losses in local government revenues from property taxes, or from losses from agricultural and forestry production, will be at least partially offset by the gains from refuge management activities and spending within other economic sectors (food, recreation, and other service sectors) generated through refuge visitation. There is no expectation of a significant impact on the economies of any subregion as a result of the proposed refuge expansion. However, in some of the more forestry based economies, it could result in some diversification in the economic base in the service sectors.

While quantifying individual ecosystem service values was beyond the scope of their report, USGS authors report notes that the economic value of a refuge encompasses more than just the direct impacts to the regional economy. Refuges and other conservation areas also provide substantial nonmarket values (values for items not exchanged in established markets) such as conserving threatened and endangered species, preserving

wetlands, developing future generations of citizen stewards and outdoor enthusiasts, and adding stability to the ecosystem (Caudill and Henderson 2003). Other services include water supply and quality, flood protection, aesthetic beauty, and quality of life values. These natural “services” provided by the conserved landscape can be extremely valuable to one’s well-being and to society. A study by Ingraham and Foster (2008) attempted to value the bundle of ecosystem services provided by national wildlife refuges in the contiguous U.S. The authors determined that various habitats within the Refuge System were providing services valued at \$32.3 billion (2011 dollars) per year, or an average of \$2,900 per acre per year. As such, these ecosystem service values can be substantial and should not be overlooked or underestimated.

Cultural Resources

Refuge lands will increase protection for cultural resources in the area. Service ownership will protect unidentified or undeveloped cultural sites from disturbance or destruction. Partnering with Native American Tribal Governments will aid in identifying and protecting sites, cultural landscapes, and specific biota of importance to the tribe(s). Potential interpretation and environmental education programs could continue to promote public understanding and appreciation of the area’s rich cultural resources. Taken together, we believe there to be a net positive effect to the cultural and historic resources of the region.

Impacts on Other Community Resources

Many other values associated with the lands and waters in the watershed are important to communities. We mention below four that would be protected and enhanced through our proposal.

Historical and Cultural Conservation

The river has a long and storied history in the development of both Native and settlement cultures and played a pivotal role in the development of New England’s rural commerce. The proposal is respectful of the working landscape tradition and the New England Governors’ recent compact to sustain forestry and agriculture as a priority within this large working landscape.

River and Riparian Conservation and Restoration

The river is perhaps New England’s richest, bordered by some of the region’s most productive soils and floodplain forest habitat. Consistent with the refuge’s legislated purposes, the removal of barriers to the passage of aquatic species and improvements to aquatic and riparian habitat, are a prominent and priority focus for the refuge on public and private land. In addition, a concerted public and private partnership effort will be made to restore riparian forest, floodplain forests, and natural water regimes (quality, rate, and timing) within the watershed.

Recreational Opportunities

Providing and maintaining recreational opportunities, especially access to the river, is of paramount concern to local communities. This would be a priority on lands within our proposal, as it has been to-date on existing refuge lands. We would also continue to provide opportunities for fishing, hunting, wildlife observation, photography, environmental education, and interpretation. Snowmobiling is very popular in various regions of the watershed, and is permitted on refuge lands, where appropriate, compatible, and where the trail is part of an existing State-recognized trail system.

The proposal would enhance protection of the Appalachian Trail which meanders through the northern-half of the watershed, making its way through the impressive White Mountain National Forest in New Hampshire. Land acquisition would also enhance tourism in local communities. The middle portion of the watershed in Massachusetts is bordered by the Berkshire Mountains to the west, which have been attracting tourists and recreationists for decades. Towns in the southern portion near the mouth of the river heavily promote recreation opportunities associated with saltwater experiences.

Expanding Service ownership would increase public opportunities for appropriate and compatible wildlife-dependent recreation. In particular, hunting, fishing, wildlife observation, nature photography, environmental education, and interpretation would be encouraged where compatible. Increased recreational opportunities on and adjacent to refuge land could protect a dependable destination to accommodate the demand for traditional outdoor activities, maintaining elements of the local culture while attracting visitors, and potentially, an additional source of revenue for local and regional economies.

XI. Public Review of Proposal

Public Scoping

The Service recognizes that effective and responsive conservation begins with community involvement. We announced the initiation of the Conte Refuge draft CCP/EIS and a public scoping and comment period through a *Federal Register* notice of intent on October 11, 2006. During this step, we sought public involvement in the planning process. From the responses we received, we developed a list of points of interest, challenges, opportunities, or any other item requiring a management decision.

During the public and partner scoping period we used the following techniques to ensure we reached out to a wide variety of stakeholders and obtain all of the points of interest, challenges, and opportunities identified by the public, our conservation partners, and other Service program staff:

- An “issues workbook” which asked recipients questions about their interest and concerns related to the refuge.
- Public scoping meetings held throughout the watershed where we explained the planning process and gathered comments. We held 9 meetings in the fall of 2006 and then another 12 in the winter of 2007 to 2008.
- CCP planning team meetings with State representatives and invited guest experts to share information.
- Meetings sponsored by the Friends of Conte Refuge.
- Meetings to coordinate with other Service programs and other Federal and State agencies.
- Conversations between staff and individuals or groups.

Public Review and Comment of Proposal

The Draft EIS/CCP and LPP will be made available for public review and comment for a period of 90 days. Concurrently, a series of information meetings will be convened in the vicinity of CFAs to afford an opportunity for the affected public to ask questions and obtain additional information. In addition, a public hearing will be held in each of the four states in the watershed.

The public will be able to submit comments by one of the following methods:

- (1) Electronically via the Federal eRulemaking Portal: <http://www.regulations.gov>. In the “Search” box, commenters will enter the docket number for this project. Comments can be submitted by clicking on “Comment Now!” Attachments can be made to the electronic comment form.
- (2) By hard copy via U.S. mail or hand-delivery to: Public Comments Processing, Attn: [FWS-R5-NWRS-2015-0036]; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042-PDM; Arlington, VA 22203.
- (3) Via oral public testimony at one of the four public hearings that will be scheduled; e.g. one hearing per state.

Our request will be to send comments only by one of the methods described above. All comments will be posted to <http://www.regulations.gov> and will be viewable by anyone accessing the site. This generally means that we will post any personal information you provide us.

All public comments will be treated the same regardless of how they were submitted.

Comments received during the comment period will be used to revise and refine the final CCP/EIS and LPP. The Service’s response to public comments will be provided as an appendix to the final plan. The final CCP/EIS will be distributed for an additional 30-day review period. The availability of the draft and final documents, and information on the respective comment periods, will be published as a notice in the *Federal Register*. After the final CCP/EIS has undergone a 30-day review, our Director can make a decision on this project proposal.

Attachment I

Proposed Land Protection Plan for Silvio O. Conte National Fish and Wildlife Refuge Contributions of Plan to Waterfowl and other Migratory Bird Objectives

In this attachment, we provide estimates of the potential number of breeding birds that could be supported within the proposed Conte Refuge CFAs and the acres of potentially suitable breeding habitat within those proposed CFAs. These CFAs are included as part of the refuge's draft CCP/EIS Service-preferred alternative C. We provide these estimates for six neotropical migrant species that are: (1) identified as Priority Refuge Resources of Concern; (2) are identified as priority species within BCR plans; and, (3) represent the range of upland and wetland habitat types within the CFAs. The six species are:

- Wood thrush.
- Canada warbler.
- Blackburnian warbler.
- Black-throated blue warbler.
- American woodcock.
- Bobolink.

Four of these six species (wood thrush, blackburnian warbler, American woodcock, and bobolink) have been identified as representative (also referred to as "surrogate") species by the NALCC. In addition to the breeding neotropical migrants, we identify potential contributions of the CFAs to waterfowl habitat, American black duck and wood duck breeding populations, and neotropical migrant stopover habitat.

We also present population estimates and acres of potentially suitable habitat contributed by existing conserved lands within the watershed. Looking at existing conserved lands provides perspective on what additional migratory bird benefits would be provided to the conservation estate by acquiring the proposed lands within the CFAs. We compare our estimates for the CFAs and conserved lands to population and habitat objectives that have been established at the BCR and State scales as reported in the BCRs 14 (Atlantic Northern Forest—<http://www.acjv.org/bcr14.htm>; accessed May 2014) and 30 (New England–Mid-Atlantic Coast - <http://www.acjv.org/bcr30.htm>; accessed May 2014) or the Partners in Flight North American Landbird Conservation Plan (http://www.partnersinflight.org/cont_plan/; accessed May 2014).

Bird population estimates were derived by applying published density estimates by habitat types (e.g., from the Birds of North America species accounts) to the acres of the different habitat types occurring within the CFAs. We have also included in our analyses the 8,000 acres of undesignated lands to be part of the Quonotuck CFA by assuming that these lands will represent approximately 1,500 acres of tidal marsh and floodplain habitat along the mouth and lower extremities of the river in Connecticut, approximately 1,500 acres of floodplain forest along the river and major tributaries in Massachusetts, and approximately 5,000 acres of floodplain forest along the upper portion of the river and major tributaries and distributed evenly between New Hampshire and Vermont. We typically used numbers at the lower end of the range of published density estimates because high densities usually reflect the most suitable habitat but we are trying to estimate populations across the landscape, which will include a range of habitat quality. We also acknowledge that the published bird population objectives typically reflect relatively low densities at landscape scales, and we wanted our estimates to be as comparable with those objectives as possible.

Summary of Proposed Conte Refuge Land Acquisition Contributions to Migratory Birds

The proposed land acquisition by Conte Refuge under the draft CCP/EIS alternative C will make significant contributions to state-level breeding population objectives for several neotropical migrants and toward overall waterfowl habitat objectives as well as toward breeding habitat for two high priority waterfowl species. We evaluated the potential for this proposal to benefit four neotropical migrant birds. For the wood thrush and Canada warbler, the proposed acquisitions could potentially meet 2 to 11 percent of the four States' breeding population objectives. For the black-throated blue warbler, we estimate that the proposed land acquisition within the CFAs could potentially contribute 10 to 20 percent of the State's breeding population objectives. For the blackburnian warbler, our proposal could contribute between 4 to 12 percent of the State's objectives.

The proposed land acquisition would also make significant contributions to the habitat objectives for three waterfowl focus areas identified in the ACJV's Waterfowl Implementation Plan: the Connecticut River and Tidal Wetlands Complex Focus Area in Connecticut, the Connecticut River Focus Area in New Hampshire

and Vermont, and the Lake Memphremagog Focus Area in northern Vermont. The proposed land acquisition will also protect significant breeding habitat for American black duck and wood duck, potentially supporting approximately 1,000 and 4,000 breeding pairs, respectively.

In addition, a study of neotropical migrant habitat use during migration suggests that habitat protection within the watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the mainstem of the river.

A. Wood thrush

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide approximately 155,450 acres of deciduous and mixed upland forests and forested wetlands representing potentially suitable habitat for wood thrush. With protection and appropriate management (to be specified in refuge habitat management plans), these acres have the potential to support an estimated wood thrush population of 31,180 birds. With protection and appropriate management within the network of conserved lands in the watershed, the network could potentially support an estimated wood thrush population of 273,145 birds on 1,362,025 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

	BCR 14¹ Population Objectives. = 1,462,100 Habitat Objectives = 9,031,900ac	BCR 30² Population Objectives = 825,000 Habitat Objectives = 6,875,000ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	26,040	5,138
Percent (%) of BCR population objective contributed by all CFAs	1.8%	0.6%
Estimated population on all Conserved Lands	250,010	23,135
Percent (%) of BCR population objective contributed by all Conserved Lands	17%	2.8%
<u>Acres of Habitat</u>		
Acres of potentially suitable habitat on CFAs	112,085	43,365
Percent (%) of BCR habitat objective contributed by all CFAs	1.2%	0.6%
Acres of potentially suitable habitat on Conserved Lands	1,263,710	98,315
Percent (%) of BCR habitat objective contributed by all Conserved Lands	14%	1.4%

¹ *Population and habitat objectives from the BCR 14 Bird Conservation Plan.*

² *Population and habitat objectives from the BCR 30 Bird Conservation Plan.*

The proposed CFAs will provide a disproportionately large contribution to the BCR14 population and habitat objectives for wood thrush. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14,

but will contribute 1.2 percent of the BCR 14 wood thrush habitat objective and 1.8 percent of the BCR 14 wood thrush population objective.

We also provide the following breakdown of these bird population and habitat numbers for wood thrush by state:

	Connecticut Population Objectives = 150,000 Habitat Objectives = 1,250,000ac	Massachusetts Populations Objectives = 155,000 Habitat Objectives = 957,510ac	New Hampshire Population Objectives = 200,910 Habitat Objectives = 1,241,120ac	Vermont Population Objectives = 242,390 Habitat Objectives = 1,497,365ac
Wood thrush				
<u>Population Estimates</u> (# of individuals)				
Estimated population on all CFAs	5,138	3,915	9,505	13,300
Percent (%) of BCR population objective contributed by all CFAs	3.4%	2.5%	4.7%	5.5%
Estimated population on all Conserved Lands	23,130	77,035	77,590	91,715
Percent (%) of BCR population objective contributed by all Conserved Lands	15%	50%	39%	38%
<u>Acres of Habitat</u>				
Acres of potentially suitable habitat on CFAs	43,365	19,565	47,170	65,865
Percent (%) of BCR habitat objective contributed by all CFAs	3.5%	2.0%	3.8%	4.4%
Acres of potentially suitable habitat on Conserved Lands	98,315	387,990	383,900	453,740
Percent (%) of BCR habitat objective contributed by all Conserved Lands	7.9%	41%	31%	30%

B. Canada warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide approximately 209,910 acres of upland forests, forested wetlands, and shrub wetlands representing potentially suitable habitat for Canada warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated Canada warbler population of 4,790 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated Canada warbler population of 42,170 birds on 1,656,725 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCR and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Canada warbler	BCR 14¹ Pop. Obj. = 272,600 Habitat Obj. = 11,937,630ac	BCR 30² Pop. Obj. = 6,000 Habitat Obj. = 235,720ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	4,300	490
Percent (%) of BCR population objective contributed by all CFAs	1.6%	11%
Estimated population on all Conserved Lands	40,030	2,140
Percent (%) of BCR population objective contributed by all Conserved Lands	15%	48%
<u>Acres of Habitat</u>		
Acres of available habitat on all CFAs	165,800	44,050
Percent (%) of BCR habitat objective contributed by all CFAs	1.4%	22%
Acres of available habitat on all Conserved Lands	1,558,575	98,150
Percent (%) of BCR habitat objective contributed by all Conserved Lands	13%	50%

¹ Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.

² Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies

We also provide the following breakdown of these bird population and habitat numbers for Canada warbler by state:

Canada warbler	Connecticut Pop. Obj. = 4,500 Habitat Obj. = 197,065ac	Massachusetts Pop. Obj. = 12,000 Habitat Obj. = 473,289	New Hampshire Pop. Obj. = 30,000 Habitat Obj. = 1,178,600	Vermont Pop. Obj. = 28,500 Habitat Obj. = 1,119,675
<u>Population Estimates</u> (# of individuals)				
Estimated population on all CFAs	490	455	1,520	2,295
Percent (%) of BCR population objective contributed by all CFAs	11%	3.8%	5.1%	8.1%
Estimated population on all Conserved Lands	2,140	9,410	15,265	14,520
Percent (%) of BCR population objective contributed by all Conserved Lands	48%	78%	51%	51%

	Connecticut Pop. Obj. = 4,500 Habitat Obj. = 197,065ac	Massachusetts Pop. Obj. = 12,000 Habitat Obj. = 473,289	New Hampshire Pop. Obj. = 30,000 Habitat Obj. = 1,178,600	Vermont Pop. Obj. = 28,500 Habitat Obj. = 1,119,675
Canada warbler				
<u>Acres of Habitat</u>				
Acres of potentially suitable habitat on CFAs	44,050	20,175	58,470	87,155
Percent (%) of BCR habitat objective contributed by all CFAs	22%	3.8%	4.5%	7.0%
Acres of potentially suitable habitat on Conserved Lands	98,150	400,410	582,870	560,760
Percent (%) of BCR habitat objective contributed by all Conserved Lands	50%	85%	49%	50%

C. Blackburnian warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide approximately 182,525 acres of coniferous and mixed upland forests representing potentially suitable habitat for blackburnian warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated blackburnian warbler population of 26,580 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated blackburnian warbler population of 232,720 birds on 1,636,020 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

	BCR 14¹ Pop. Obj. = 850,000 Habitat Obj. = 14,002,330ac	BCR 30² Pop. Obj. = 8,000 Habitat obj. = 494,200ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	26,070	508
Percent (%) of BCR population objective contributed by all CFAs	3.1%	6.4%
Estimated population on all Conserved Lands	231,640	2,160
Percent (%) of BCR population objective contributed by all Conserved Lands	27%	27%
<u>Acres of Habitat</u>		
Acres of potentially suitable habitat on all CFAs	139,285	43,240
Percent (%) of BCR habitat objective contributed by all CFAs	1.0%	8.7%
Acres of potentially suitable habitat on Conserved Lands	1,539,915	96,110
Percent (%) of BCR habitat objective contributed by Conserved Lands	11%	19%

¹ Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.

² Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.

The proposed CFAs will provide a disproportionately large contribution to the BCR14 population and habitat objectives for blackburnian warbler. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14, but will contribute 1.0 percent of the BCR 14 wood thrush habitat objective and 3.1 percent of the BCR 14 wood thrush population objective.

We also provide the following breakdown of these bird population and habitat numbers for blackburnian warbler by state:

	Connecticut Pop. Obj. = 8,000 Habitat Obj. = 494,200ac	Massachusetts Pop. Obj. = 80,000 Habitat Obj. = 1,317,870ac	New Hampshire Pop. Obj. = 170,000 Habitat Obj. = 2,800,470ac	Vermont Pop. Obj. = 110,000 Habitat Obj. = 1,812,070ac
Blackburnian warbler				
<u>Population Estimates</u> (# of individuals)				
Estimated population on all CFAs	510	3,035	8,760	12,780
Percent (%) of BCR population objective contributed by all CFAs	6.4%	3.8%	5.2%	12%
Estimated population on all Conserved Lands	2,160	58,390	78,980	82,630
Percent (%) of BCR population objective contributed by all Conserved Lands	27%	73%	46%	75%
<u>Acres of Habitat</u>				
Acres of potentially suitable habitat on CFAs	43,240	19,500	56,380	84,810
Percent (%) of BCR habitat objective contributed by all CFAs	8.7%	1.5%	2.0%	4.7%
Acres of potentially suitable habitat on Conserved Lands	96,110	392,615	564,870	543,725
Percent (%) of BCR habitat objective contributed by all Conserved Lands	19%	30%	20%	30%

D. Black-throated blue warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide approximately 182,720 acres of deciduous and mixed upland forests representing potentially suitable habitat for black-throated blue warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated black-throated blue warbler population of 25,410 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated black-throated blue warbler population of 216,940 birds on 1,478,170 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Black-throated blue warbler	BCR 14¹ Pop. Obj. = 565,680 Habitat Obj. = 9,318,619ac	BCR 30² Pop. Obj. = 5,000 Habitat Obj. = 308,875ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	24,200	1,210
Percent (%) of BCR population objective contributed by all CFAs	4.3%	24%
Estimated population on all Conserved Lands	214,300	2,640
Percent (%) of BCR population objective contributed by all Conserved Lands	38%	53%
<u>Acres of Habitat</u>		
Acres of potentially suitable habitat on all CFAs	140,410	42,310
Percent (%) of BCR habitat objective contributed by all CFAs	1.5%	14%
Acres of potentially suitable habitat on Conserved Lands	1,381,430	96,740
Percent (%) of BCR habitat objective contributed by all Conserved Lands	15%	31%

¹ Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.

² Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.

The proposed CFAs will provide a disproportionately large contribution to the BCR14 and BCR 30 population and habitat objectives for black-throated blue warbler. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14, but will contribute 1.5 percent of the BCR 14 black-throated blue warbler habitat objective and 4.3 percent of the BCR 14 black-throated blue warbler population objective. Similarly, the total proposed CFA acreage represents 0.1 percent of BCR 30, but will contribute 9.8 percent of the BCR 30 black-throated blue warbler habitat objective and 17 percent of the BCR 30 black-throated blue warbler population objective.

We also provide the following breakdown of these bird population and habitat numbers for black-throated blue warbler by state:

Black-throated blue warbler	Connecticut Pop. Obj. = 7,000 Habitat Obj. = 432,425ac	Massachusetts Pop. Obj. = 30,000 Habitat Obj. = 494,200ac	New Hampshire Pop. Obj. = 60,000 Habitat Obj. = 988,400	Vermont Pop. Obj. = 60,000 Habitat Obj. = 988,400
<u>Population Estimates</u> (# of individuals)				
Estimated population on all CFAs	1,210	3,035	8,175	11,740
Percent (%) of BCR population objective contributed by all CFAs	17%	10%	14%	20%
Estimated population on all Conserved Lands	2,640	58,295	65,475	76,740
Percent (%) of BCR population objective contributed by all Conserved Lands	38%	194%	109%	128%
<u>Acres of Habitat</u>				
Acres of potentially suitable habitat on CFAs	42,310	19,815	52,300	83,950
Percent (%) of BCR habitat objective contributed by all CFAs	9.8%	4.0%	5.7%	8.5%
Acres of potentially suitable habitat on Conserved Lands	96,745	394,035	438,455	509,535
Percent (%) of BCR habitat objective contributed by all Conserved Lands	22%	80%	44%	52%

E. American woodcock

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide approximately 185,590 acres of upland forest, forested wetland, and wet shrub habitat representing potentially suitable habitat for American woodcock. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated American woodcock population of 4,565 birds. With protection and appropriate management within the network of conserved lands in the watershed, the network could potentially support an estimated American woodcock population of 38,080 birds on 1,496,670 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

American woodcock	BCR 14¹ Pop. Obj.* = 163,090 Habitat Obj. = 4,006,045ac	BCR 30¹ Pop. Obj.* = 46,268 Habitat obj. = 2,230,080ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	3,655	910
Percent (%) of BCR population objective contributed by all CFAs	2.2%	2.0%
Estimated population on all Conserved Lands	36,045	2,035
Percent (%) of BCR population objective contributed by all Conserved Lands	22%	4.4%
<u>Acres of Habitat</u>		
Acres of potentially suitable habitat on all CFAs	141,720	43,870
Percent (%) of BCR habitat objective contributed by all CFAs	3.5%	2.0%
Acres of potentially suitable habitat on Conserved Lands	1,398,520	98,150
Percent (%) of BCR habitat objective contributed by all Conserved Lands	35%	4%

¹ Population objectives presented from the American Woodcock Conservation Plan (http://www.timberdoodle.org/sites/default/files/woodcockPlan_0.pdf; accessed May 2014) are expressed in terms of number of singing males to be added to the current breeding population and habitat objectives are expressed in terms of number of additional early succession acres needed to support those additional birds.

Assessing Contribution of Potential Management Activities to Create Successional Habitat

Active habitat management to create successional habitat for American woodcock and other disturbance-dependent wildlife (e.g., NEC) is likely to be incorporated into the habitat management plans for various CFAs in the watershed. Three of the CFAs occur within NEC focus areas, where there are targets of maintaining 1,000 acres of early successional habitat within each NEC focus area. Conte Refuge lands would not be contributing all these acres to each NEC focus area, but for the purposes of this analysis, we assume that the refuge would plan to contribute about 25 percent of these acres, or 775 acres across the three NEC focus areas. In addition, we assume that following recent management history on the refuge, approximately 60 acres will be actively managed every 5 years within acquired forest land, for a total of 180 acres over the 15 year period of this CCP. On the acres to be actively managed for early successional habitat, we assume breeding woodcock densities to be twice the density in appropriate habitat types without active management. Under these assumptions for active habitat management for early successional habitat, a total American woodcock population of 4,610 could be supported within the CFAs, with BCR breakdowns as follows:

American woodcock	BCR 14 Pop. Obj. = 163,090 Habitat Obj. = 4,006,045ac	BCR 30 Pop. Obj. = 46,268 Habitat obj. = 2,230,080ac
Estimated population on all CFAs	3,665	945
Percent (%) of BCR population objective contributed by all CFAs	2.2%	2.0%
Acres of potentially suitable habitat on CFAs	141,900	44,645
Percent (%) of BCR habitat objective contributed by all CFAs	3.5%	2.0%

F. Bobolink

Under the draft CCP/EIS alternative C, Conte Refuge would acquire up to 8,211 acres of pasture, hay, grassland, and other lower quality agricultural lands within the watershed. As these lands are acquired, they will be assessed to determine what their best habitat contribution is and to decide if those in grassland habitat will continue to be maintained as grassland habitat.

The National Land Cover Dataset (NLCD 2006) suggests that approximately 50 percent of the pasture, hay, grassland, and agricultural lands within the Connecticut River Valley are typically maintained in grassland habitat (pasture, hay, or grassland) and about 50 percent are maintained in row crop agriculture. Based on this information, we anticipate that up to 4,105 acres of grassland habitat could be restored after the existing grassland, hay, and pasture is acquired under the draft CCP/EIS alternative C.

With protection and appropriate management (to be specified in habitat management plans) of these acres within the CFAs, Conte Refuge lands could potentially support an estimated bobolink population of 920 birds on 4,105 acres of potentially suitable grassland habitat. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons. We also provide estimates of bobolink populations and acres of potentially suitable habitat on the existing conserved lands network within the watershed for comparison with lands targeted by the proposed land acquisition.

	BCR 14¹ Pop. Obj. = 1,535,965 Habitat Obj. = 3,795,370ac	BCR 30² Pop. Obj. = 30,000 Habitat obj. = 74,130ac
<u>Population Estimates</u> (# of individuals)		
Estimated population on all CFAs	555	365
Percent (%) of BCR population objective contributed by all CFAs	0.03%	1.2%
Estimated population on existing Conserved Lands	10,020	170
Percent (%) of BCR population objective contributed by Conserved Lands	0.7%	0.6%
<u>Acres of Habitat</u>		
Acres of potentially suitable habitat in CFAs	1,370	2,735
Percent (%) of BCR habitat objective contributed by all CFAs	0.03%	3.7%
Acres of potentially suitable habitat on existing Conserved Lands	24,765	1,285
Percent (%) of BCR habitat objective contributed by Conserved Lands	0.7%	1.7%

¹ Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.

² Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.

G. Waterfowl habitat, American black duck, and wood duck

The ACJV has established habitat objectives within waterfowl focus areas for supporting the full suite of waterfowl occurring within the ACJV boundaries. Three of these focus areas exist within the watershed: (1) the Connecticut River and Tidal Wetlands Complex Focus Area along the lower Connecticut River in Connecticut, (2) the Connecticut River Focus Area, which runs along the Connecticut River in New Hampshire and Vermont, from the Massachusetts border to the river origin, and (3) the Lake Memphremagog Focus Area in Essex and Orleans County in northern Vermont.

American black duck is a high priority species for the NAWMP, the ACJV, BCR 14, and is the focus of the Black Duck Joint Venture. The ACJV is currently in the process of establishing breeding population objectives for this species, but they were not available yet at the time this document was written. We provide estimates of acres of potential black duck habitat within CFAs and the estimated number of breeding black duck pairs that could potentially be supported by this habitat. Comparisons with population objectives can be done when the breeding population objectives have been completed by the ACJV.

Wood duck is identified as a high priority species for the Atlantic Flyway Council and as a continentally high priority species for the NAWMP. BCR 14 is recognized by the NAWMP as a high priority region for breeding need and BCR 30 is considered a moderate priority region for breeding need for wood duck. While no regional population objectives have been established for wood duck, the regional priority rankings suggest that the watershed can make significant contributions to sustaining the Atlantic Flyway population at or above target levels for harvest management purposes.

By protecting additional freshwater wetlands and saltmarsh, contributions that the proposed land protection under draft CCP/EIS alternative C could be expected to make toward waterfowl habitat objectives within the ACJV waterfowl focus areas and toward supporting breeding populations of American black duck and wood duck are as follows:

ACJV Waterfowl Focus Area	ACJV Waterfowl Habitat Objective (acres)	Acres of wetland habitat in CFAs within Focus Areas	Percent (%) of Waterfowl Habitat Objective contributed by CFAs
Connecticut River and Tidal Wetlands Complex – in CT	1,157	1,700	147%
Connecticut River – in NH	3,200	3,100	97%
Connecticut River – in VT	250	1,240	496%
Lake Memphremagog –in VT	5,101	3,969	78%
Total for entire Atlantic Flyway	1,577,594	10,009	0.6%

State	Acres of Potential Wood Duck Breeding Habitat in all CFAs (including freshwater wetland and forested wetland)	Potential Breeding American Black Duck Population Supported within CFAs (# of breeding pairs, estimated at 0.1-0.05 pairs/ha of potential habitat, depending on suitability ¹)	Potential Breeding Wood Duck Population Supported within CFAs (# of breeding pairs, estimated at 0.25 pairs/acre of potential habitat ²)
CT	6,685	135	1,671
MA	2,590	520	648
NH	3,816	154	954
VT	3,378	137	845
Watershed Total	16,469	946	4,118

¹ Based on estimates of breeding pair estimates from Maisonneuve, et al. 2006. Journal of Wildlife Management. 70:450-459; and Merendinno and Ankney. 1994. Condor. 96:411-421.

² Based on estimates of cavity densities presented in Dugger and Fredrickson. 1992. Life History and Habitat Needs of the Wood Duck in The Waterfowl Management Handbook. Fish and Wildlife Leaflet 13. U.S. Fish and Wildlife Service, Washington, DC. (http://www.nwrc.usgs.gov/wdb/pub/wmh/13_1_6.pdf)

H. Migratory Stopover Habitat

A study of spring stopover habitat use by neotropical migrant birds within the Connecticut River Valley (<http://www.science.smith.edu/stopoverbirds/index.html>) conducted by Smith College through funding by Conte Refuge and the Service's Northeast Region–Migratory Bird Program provides indications of the importance of the watershed to migrating birds. During a 3-year study (1996 to 1998), observers conducted 8,640 point count surveys and counted a total of 102,259 birds. The results demonstrated that spring migrant birds using the Eastern Flyway reach the southern portions of the watershed in large numbers, then disperse throughout the watershed and beyond as they continue north. Almost half (47 percent) of the birds counted within the defined count circles were at sites along the mainstem of the river. This trend was even more pronounced along the Connecticut and Massachusetts portions of the river and during the early periods of spring migration. Forested wetlands and shrub swamps are likely to be particularly valuable habitats along the mainstem of the river because they provide more food and protection earlier in the spring migratory period due to warmer air and water temperatures and earlier tree leaf-out. Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the mainstem of the river as they moved north. The mouth and lower mainstem of the river may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast. The results of this study suggest that habitat protection within the watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the mainstem of the river.

Attachment II

Conservation Focus Area (CFA) Parcel Tables and Corresponding Parcel Maps

The following table (CII.1) and map (CII.1) provide an example of how the approximately 5,000 individual land parcels are detailed in our proposal. Access to CFA parcel maps and tier assignments that comprise the full project is available on our Website at http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.

The following example of table and corresponding map present the unique map identifier for each individual parcel, the parcel's official identifier in town or county records, its size in acres, whether it is currently in public or private ownership, our priority ranking for the parcel represented in tiers, the State it is in, the Town it is in, and whether it has any existing conservation status.

As detailed in Part IV of the LPP, we plan to only acquire either a full or partial interest in a parcel when willing sellers make them available and if funding is available. Due to our willing seller only policy and longstanding practice and other landowner preferences; approximately 10 percent of the parcels or 10 percent of the land included in the LPP will likely not be acquired by the Service. The following is a list of the definitions of each column heading:

CFA ¹ Map Number	Parcel ² Label	Tax ³ Par- cel ID	Acres ⁴	Own- ership Type ⁵	Tier ⁶	State ⁷	Town ⁸	Current Conserva- tion Status, if any ⁹
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¹ **CFA Map Number:** A three letter acronym provides a unique identifier for each respective CFA.

² **Parcel Label:** This number corresponds to the unique parcel identifier on the corresponding CFA map.

³ **Tax Parcel ID:** This numeric or alphanumeric code represents the official town or county tax identifier for the individual parcel

⁴ **Acres:** This represents the size of the individual parcel in acres based on official tax records.

⁵ **Ownership Type:** The indicates whether the current owner is a "Private" or "Public" entity

⁶ **Tier:** Individual parcels are ranked as either being in Tier 1, Tier 2, or Tier 3 based on the presence and amount of important terrestrial habitat, presence and amount of important water and wetlands habitat, and its size. Tier 1 parcels include more and larger important habitat areas and are bigger in size. See Table 4 in LPP and associated narrative for more information.

⁷ **State:** This indicates the respective State the parcel lies in.

⁸ **Town:** This indicates the respective Town the parcel lies in.

⁹ **Conservation Status:** This indicates whether the parcel has any existing conservation status based on an interest from another conservation organization. If known, fee interest or easement interest is indicated. We would not pursue acquisition of land already in an existing, permanent conservation status, except under extenuating circumstances.

Table CII.1. Example Parcel Table for Proposed Blueberry Swamp Conservation Focus Area (CFA) (full project can be accessed at: http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html)

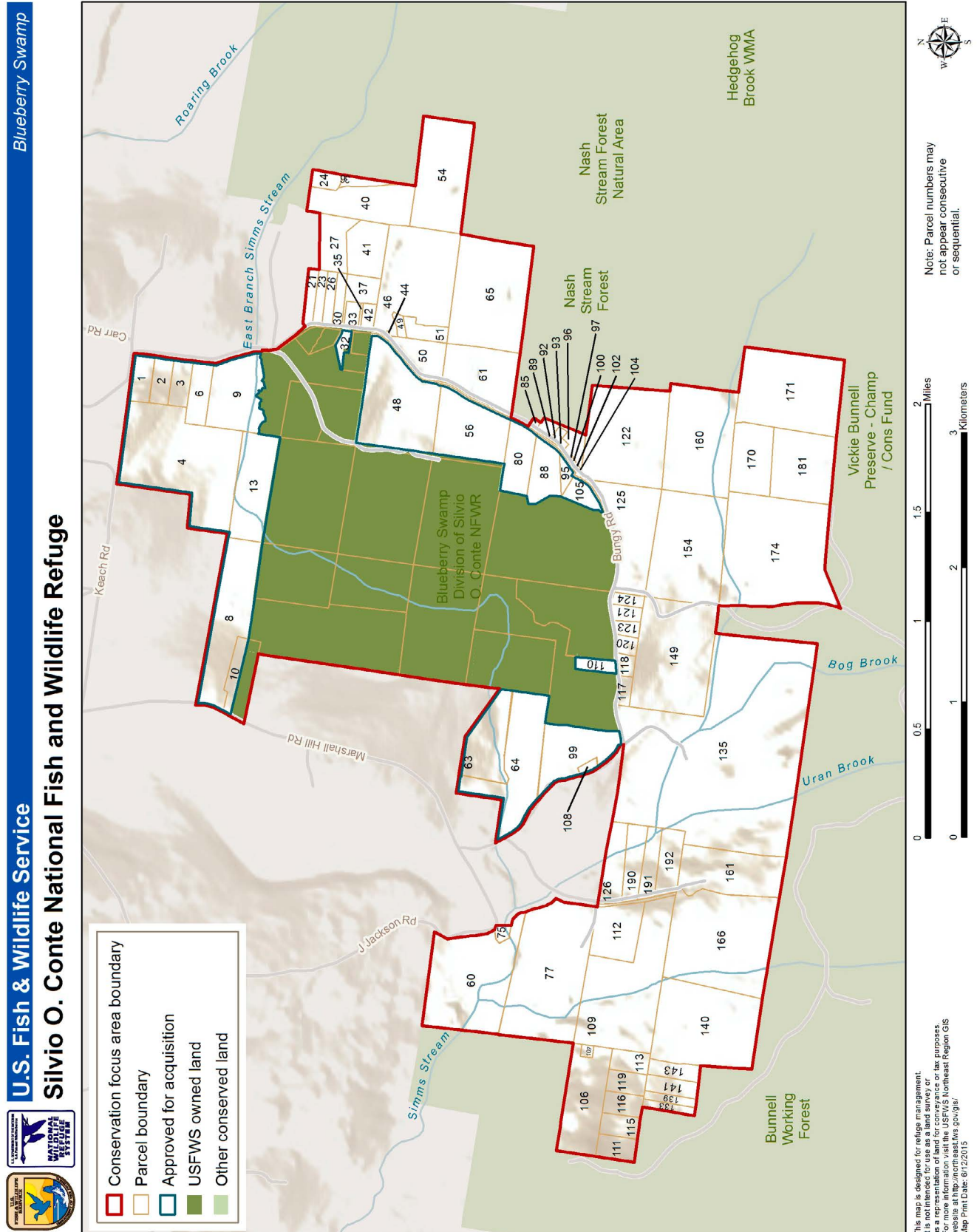
CFA ¹ Map Number	Parcel ² Label	Tax ³ Parcel ID	Acres ⁴	Ownership Type ⁵	Tier ⁶	State ⁷	Town ⁸	Existing Con- servation Sta- tus (if any) ⁹
BBS1	1	420-17	14.0	Private	2	NH	Columbia	
BBS1	2	420-16	12.4	Private	3	NH	Columbia	
BBS1	3	420-15	12.2	Private	3	NH	Columbia	
BBS1	4	420-18	143.9	Private	2	NH	Columbia	
BBS1	6	420-14	17.8	Private	3	NH	Columbia	

CFA¹ Map Number	Parcel² Label	Tax³ Parcel ID	Acres⁴	Ownership Type⁵	Tier⁶	State⁷	Town⁸	Existing Con- servation Sta- tus (if any)⁹
BBS1	8	417-100.2	78.5	Private	2	NH	Columbia	
BBS1	9	420-13	51.9	Private	2	NH	Columbia	
BBS1	10	417-101	11.5	Private	3	NH	Columbia	
BBS1	12	-	15.2	Federal	Conserved	NH	Columbia	Fee
BBS1	13	420-8	52.9	Private	2	NH	Columbia	
BBS1	15	-	110.9	Federal	Conserved	NH	Columbia	Fee
BBS1	17	-	56.7	Federal	Conserved	NH	Columbia	Fee
BBS1	18	-	61.0	Federal	Conserved	NH	Columbia	Fee
BBS1	19	-	23.6	Federal	Conserved	NH	Columbia	Fee
BBS1	20	-	5.5	Federal	Conserved	NH	Columbia	Fee
BBS1	21	420-60	7.8	Private	3	NH	Columbia	
BBS1	23	420-61	7.0	Private	3	NH	Columbia	
BBS1	24	420-44	6.7	Private	3	NH	Columbia	
BBS1	25	-	5.1	Federal	Conserved	NH	Columbia	Fee
BBS1	26	420-62	7.3	Private	3	NH	Columbia	
BBS1	27	420-49	22.5	Private	3	NH	Columbia	
BBS1	28	-	114.3	Federal	Conserved	NH	Columbia	Fee
BBS1	29	-	34.2	Federal	Conserved	NH	Columbia	Fee
BBS1	30	420-63	7.2	Private	3	NH	Columbia	
BBS1	31	-	119.3	Federal	Conserved	NH	Columbia	Fee
BBS1	32	420-3.2	4.6	Private	3	NH	Columbia	
BBS1	33	420-65	5.3	Private	3	NH	Columbia	
BBS1	34	-	6.7	Federal	3	NH	Columbia	
BBS1	35	420-66	0.8	Private	3	NH	Columbia	
BBS1	36	420-45	5.4	Private	3	NH	Columbia	
BBS1	37	420-64	12.9	Private	3	NH	Columbia	
BBS1	38	-	5.5	Federal	Conserved	NH	Columbia	Fee
BBS1	39	-	52.2	Federal	Conserved	NH	Columbia	Fee
BBS1	40	420-46	46.5	Private	2	NH	Columbia	
BBS1	41	420-48	27.9	Private	3	NH	Columbia	
BBS1	42	420-67	4.8	Private	3	NH	Columbia	
BBS1	44	421-11	0.1	Private	3	NH	Columbia	
BBS1	46	421-12	97.1	Private	1	NH	Columbia	
BBS1	48	421-10	95.9	Private	2	NH	Columbia	
BBS1	49	421-14	3.0	Private	3	NH	Columbia	
BBS1	50	421-15	20.4	Private	2	NH	Columbia	

CFA¹ Map Number	Parcel² Label	Tax³ Parcel ID	Acres⁴	Ownership Type⁵	Tier⁶	State⁷	Town⁸	Existing Con- servation Sta- tus (if any)⁹
BBS1	51	421-16	10.0	Private	3	NH	Columbia	
BBS1	53	-	104.5	Federal	Conserved	NH	Columbia	Fee
BBS1	54	421-13	77.4	Private	1	NH	Columbia	
BBS1	56	421-8	61.2	Private	2	NH	Columbia	
BBS1	58	-	106.2	Federal	Conserved	NH	Columbia	Fee
BBS1	60	416-18	107.8	Private	2	NH	Columbia	
BBS1	61	421-17	51.6	Private	2	NH	Columbia	
BBS1	63	416-34	43.4	Private	2	NH	Columbia	
BBS1	64	416-53	76.9	Private	2	NH	Columbia	
BBS1	65	421-18	109.2	Private	1	NH	Columbia	
BBS1	69	-	63.0	Federal	Conserved	NH	Columbia	Fee
BBS1	71	-	102.7	Federal	Conserved	NH	Columbia	Fee
BBS1	72	-	137.3	Federal	2	NH	Columbia	
BBS1	75	416-17	3.1	Private	3	NH	Columbia	
BBS1	77	416-6	134.0	Private	3	NH	Columbia	
BBS1	80	421-7	26.0	Private	3	NH	Columbia	
BBS1	85	421-20.1	1.0	Private	3	NH	Columbia	
BBS1	88	421-6	23.3	Private	3	NH	Columbia	
BBS1	89	421-21	0.3	Private	3	NH	Columbia	
BBS1	92	421-22	2.2	Private	3	NH	Columbia	
BBS1	93	421-24	1.0	Private	3	NH	Columbia	
BBS1	95	421-5	5.1	Private	3	NH	Columbia	
BBS1	96	421-28	11.7	Private	3	NH	Columbia	
BBS1	97	421-25	0.3	Private	3	NH	Columbia	
BBS1	99	416-55.2	47.0	Private	3	NH	Columbia	
BBS1	100	421-26	0.2	Private	3	NH	Columbia	
BBS1	101	-	67.1	Federal	Conserved	NH	Columbia	Fee
BBS1	102	421-28.1	0.2	Private	3	NH	Columbia	
BBS1	104	421-27	0.2	Private	3	NH	Columbia	
BBS1	105	421-3	10.9	Private	3	NH	Columbia	
BBS1	106	416-5	56.4	Private	3	NH	Columbia	
BBS1	107	416-4	2.0	Private	3	NH	Columbia	
BBS1	108	416-55.1	2.7	Private	3	NH	Columbia	
BBS1	109	416-46	119.6	Private	3	NH	Columbia	
BBS1	110	416-56.1	6.8	Private	3	NH	Columbia	
BBS1	111	411-2	12.4	Private	3	NH	Columbia	

CFA¹ Map Number	Parcel² Label	Tax³ Parcel ID	Acres⁴	Ownership Type⁵	Tier⁶	State⁷	Town⁸	Existing Con- servation Sta- tus (if any)⁹
BBS1	112	416-47	34.1	Private	3	NH	Columbia	
BBS1	113	416-3	11.1	Private	3	NH	Columbia	
BBS1	115	411-3	11.3	Private	3	NH	Columbia	
BBS1	116	416-1	11.5	Private	3	NH	Columbia	
BBS1	117	416-61	5.9	Private	3	NH	Columbia	
BBS1	118	416-60	5.6	Private	3	NH	Columbia	
BBS1	119	416-2	11.4	Private	3	NH	Columbia	
BBS1	120	416-59	5.7	Private	3	NH	Columbia	
BBS1	121	421-34	6.4	Private	3	NH	Columbia	
BBS1	122	421-29	104.7	Private	3	NH	Columbia	
BBS1	123	416-58	5.2	Private	3	NH	Columbia	
BBS1	124	421-32	5.1	Private	3	NH	Columbia	
BBS1	125	421-30	62.8	Private	2	NH	Columbia	
BBS1	126	416-43.1	22.3	Private	2	NH	Columbia	
BBS1	133	416-52	5.9	Private	3	NH	Columbia	
BBS1	135	416-62.1	422.3	Private	2	NH	Columbia	
BBS1	139	416-51	6.0	Private	3	NH	Columbia	
BBS1	140	416-48	108.8	Private	3	NH	Columbia	
BBS1	141	416-50	11.8	Private	3	NH	Columbia	
BBS1	143	416-49	11.2	Private	3	NH	Columbia	
BBS1	149	421-33	114.0	Private	3	NH	Columbia	
BBS1	154	421-31	104.6	Private	2	NH	Columbia	
BBS1	160	421-31.01	97.5	Private	2	NH	Columbia	
BBS1	161	416-44	60.7	Private	3	NH	Columbia	
BBS1	166	416-45	132.5	Private	2	NH	Columbia	
BBS1	170	422-2.2	38.3	Private	3	NH	Columbia	
BBS1	171	422-3	105.5	Private	3	NH	Columbia	
BBS1	174	422-1	153.2	Private	1	NH	Columbia	
BBS1	181	422-2.1	58.2	Private	2	NH	Columbia	
BBS1	190	416-43.2	18.9		2	NH	Columbia	
BBS1	191	416-43.3	14.8		2	NH	Columbia	
BBS1	192	416-43.4	19.8		2	NH	Columbia	

Map CII.1. Example Parcel Map for Proposed Blueberry Swamp Conservation Focus Area (CFA) (full project can be accessed at: http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html)



Attachment III

Connecticut River Watershed Landscape Conservation Design Overview and Example of Three Data Products

Overview

The Connecticut River Watershed LCD is intended to guide and focus conservation actions, including land protection, management, restoration, and general land stewardship where it will likely do the most good towards conserving biodiversity within the Connecticut River watershed (watershed). The Connecticut River Watershed LCD provides a watershed-based conservation design to complement or supplement conservation planning done at local or finer extents. Although the Connecticut River Watershed LCD offers a way to strategically focus limited conservation resources, by itself it is not sufficient as a total solution to biodiversity conservation in the watershed. This design serves as a starting point that should be used in combination with other sources of information and tools to inform conservation decisions where a sense of role and place within a larger landscape is desirable.

The Connecticut River LCD is not a single product or map. Rather, it is a package of data products that collectively identify terrestrial core areas and connectors, aquatic core areas and their key watershed-based buffers, and restoration opportunities for dam removal, culvert upgrades, and terrestrial wildlife road passage structures. In addition to the terrestrial core-connector network product and the aquatic core-buffer network, there are 17 terrestrial data layers and 13 aquatic data layers that are considered primary products separately providing information on the ecological value of all lands and waters regardless of their inclusion in the core area network. A more comprehensive set of data products derived for the entire region are available via the University of Massachusetts Designing Sustainable Landscape project website being developed to describe in detail how these data layers were created (http://www.umass.edu/landeco/research/dsl/products/dsl_products.html; accessed April 2015).

The products were developed to test procedures for a landscape conservation design process that could be extended to the entire Northeast Region. These products are currently undergoing a review by the Connecticut River Watershed LCD core team member organizations.

We profile three primary Connecticut River Watershed LCD data products below and share an example map of how each data layer overlaps with three northern CFAs.

Terrestrial core-connector network (map CIII.1)

One of the most important products from this project is the terrestrial network of core areas and the connectors between them (core-connector network). In combination with the aquatic core areas, they spatially represent the ecological network derived from the Connecticut River Watershed LCD project. The core-connector network represents a synthesis of ecological information and is designed to provide strategic guidance for conserving natural areas, and the fish, wildlife, and other components of biodiversity that they support within the watershed.

All of the other data layers either: (1) provide additional detailed information on why particular areas were included as core areas, (2) provide useful overlays to enhance the interpretation of the core-connector network (e.g., to help prioritize areas within the network), or (3) complement the core-connector network by providing seamless and continuous ecological valuation of the landscape independent of the core-connector network (e.g., to identify places with ecological value outside of the designated network).

Core areas serve as the foundation of the conservation design. They reflect decisions by the Connecticut River Watershed LCD planning team about the highest priority areas for sustaining the long term ecological values of the watershed, based on currently available, regional-scale information. Terrestrial core areas represent the following:

(1) Areas of relatively high ecological integrity across all terrestrial and wetland ecosystem types, emphasizing areas that are relatively intact (i.e., free from human modifications and disturbance) and resilient to environmental changes (e.g., climate change). Integrity has the potential to remain high, both in the short-term due to connectivity to similar natural environments, and in the long-term due to proximity to diverse landforms and other geophysical settings.

(2) Areas of relatively high current habitat value (landscape capability) for a suite of 14 representative terrestrial wildlife species, emphasizing areas that provide the best habitat and climate conditions today.

(3) Areas of high potential for floodplain forest restoration along major rivers, emphasizing areas where geomorphic characteristics favor the development of floodplain forest.

(4) Areas of rare terrestrial natural communities that support unique biodiversity, regardless of their landscape context; inclusive of communities listed by State heritage programs as S1 (extremely rare), S2 (rare), and S3 (uncommon), with definitions of S1 to S3 varying slightly among states.

Core areas are built from focal areas with high value based on one or more of the attributes listed above. These “seed areas” are expanded to encompass surrounding areas that provide additional ecological value and resilience to both short- and long-term change. These surrounding areas within the core areas are typically of high to moderate ecological value. To maintain a coherent shape and size, in some cases core areas contain low-intensity development and minor roads, but high-intensity development and major roads are excluded. Collectively, terrestrial core areas encompass 25 percent of the watershed area, as decided by the partnership. A total of 1,202 core areas have been identified, ranging in size from approximately 20 acres to 65,500 acres, with an average size of 1,500 acres.

Connectors represent “corridors” that could facilitate the movement of plants and animals (i.e., ecological flow) between terrestrial core areas. These connectors increase the resiliency of the core area network to uncertain changing land use and climate. They are wider where more movement between cores is expected because of larger and closer core areas and a more favorable natural environment between them. Connectors primarily link adjoining core areas where there is the greatest similarity in ecosystems; they do not necessarily represent travel corridors for any individual species. Connectors may traverse through areas of low-density development and cross roads of all classes, but they do not include high-intensity development. Connectors are not identified between core areas that are greater than 10 kilometer apart. Collectively, connectors encompass an additional 22 percent of the Connecticut River watershed area.

The core area network can serve as a starting point for a regional conservation network that can be used in combination with other sources of information to direct action. Although the terrestrial core areas and connectors are presented as discrete entities, it is important to recognize that their boundaries are, in fact, “fuzzy” and are best interpreted as general places to focus attention. In addition, terrestrial core areas and connectors are not the only places of high ecological value deserving of conservation attention in the watershed.

While 25 percent of the watershed is located in areas identified as core areas, about 50 percent of the existing conserved land (1.8 million acres +/-) is located in these core areas. The Connecticut River Watershed LCD Team established a target of investing 25 percent of the watershed in strategic core areas. Therefore, a 900,000-acre increase in conservation efforts toward core areas may be deemed desirable by agency, community, and individual decision makers. Further, about 22 percent of the watershed was identified as connector habitat. Under these parameters, the refuges CFAs have a 77 percent overlap with these priority core and connector areas. When climate change was integrated into the formula, creating a more stringent and smaller percentage of the watershed, the CFA overlap actually increased to 79 percent. In essence, and under either scenario, the refuge contribution toward the larger landscape core and connector target could total approximately 150,000 of existing and proposed core and connector habitat.

Terrestrial ecological integrity selection index (map CIII.2)

This layer provides a seamless and continuous valuation of ecological integrity and biodiversity value based on regionally available and consistent spatial data, and based on decisions by the Connecticut River Watershed LCD planning team. This product is a primary input used to create terrestrial ecosystem based core areas. The selection index is a continuous surface in which every cell is assigned a value (0-1) based on its relative ecological integrity and/or biodiversity value within each USGS HUC6 watershed. Higher values represent better ecological or biodiversity conditions. Terrestrial core areas are created, in part, by choosing cells above a certain index value and spreading outwards from these seeds to build larger, buffered cores of relatively high ecological value.

Specifically, for all terrestrial and wetland cells, the selection index is a composite index derived from a weighted combination of the (1) weighted index of ecological integrity (IEI), (2) TNC's terrestrial resiliency index, and a binary representation of (3) TNC's tier 1 floodplains and (4) S1-S3 rare natural communities as defined and mapped by the state Natural Heritage programs. For aquatic cells (which are also included in this layer), the index is equal to IEI, except in headwater creeks where IEI is averaged with USGS's stream temperature tolerance index.

Importantly, this layer provides an ecological valuation of areas both inside and outside designated core areas, and thus it can be used to identify places of high ecological value outside of designated core areas that are also deserving of conservation attention.

Species landscape capability (map CIII.3)

This product provides a seamless and continuous valuation of landscape capability for each of the 14 representative terrestrial wildlife species modeled in the Connecticut River Watershed LCD project. This product is another primary input used to create terrestrial ecosystem based core areas. The 14 modeled species are:

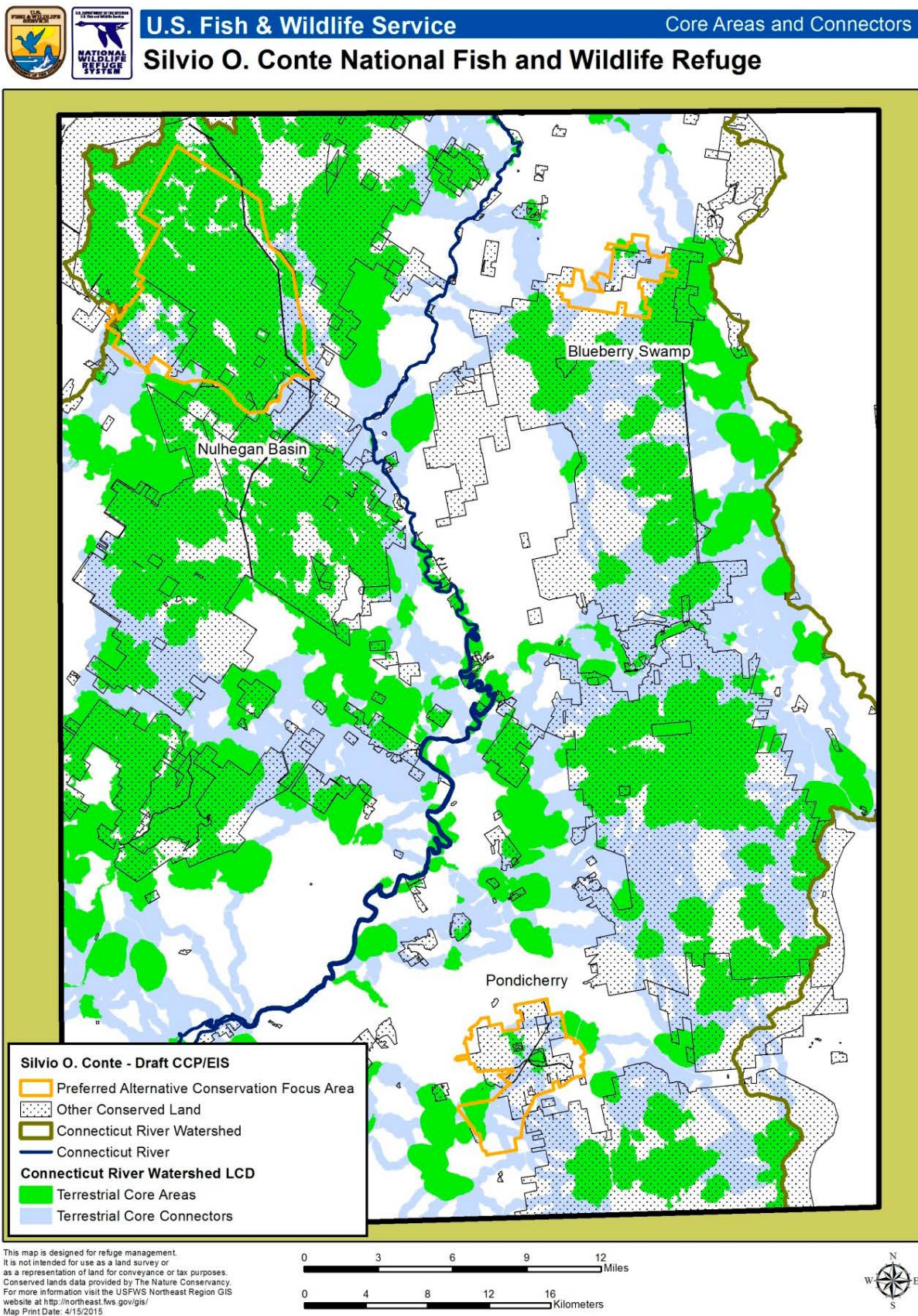
- (1) American woodcock
- (2) Black bear
- (3) Blackburnian warbler
- (4) Blackpoll warbler
- (5) Eastern meadowlark
- (6) Louisiana waterthrush
- (7) Marsh wren
- (8) Moose
- (9) Northern waterthrush
- (10) Prairie warbler
- (11) Ruffed grouse
- (12) Wood duck
- (13) Wood thrush
- (14) Wood turtle

Landscape capability is an integrated measure of habitat capability, climate suitability and species' prevalence, and is based on a unique model developed for each species. There are several different landscape capability indices that reflect different decisions (or assumptions) regarding how to incorporate current versus future land use and climate changes. The example provided here is based on the current landscape capability index for blackburnian warbler.

The landscape capability maps for each species provide an ecological valuation of areas, both inside and outside designated core areas, and thus they can be used to identify places of high ecological value for one or more representative species, outside of designated core areas, that are also deserving of conservation attention.

Since species were modeled individually, the landscape capability index is not comparable across species. It can only be used separately for each species to evaluate the relative capability of one location against another to support that species. The index is also not an estimate of occupancy. It does not give the probability that a cell will be occupied by the species. Rather, it is an index of the relative capability of a site to support reproduction and survival of the focal species in a home range centered on that cell.

Map CIII.1. Example of How the Blueberry Swamp, Nulhegan Basin, and Pondicherry CFAs Overlap with the Connecticut River Watershed LCD Project's Terrestrial Core-connector Network Product.



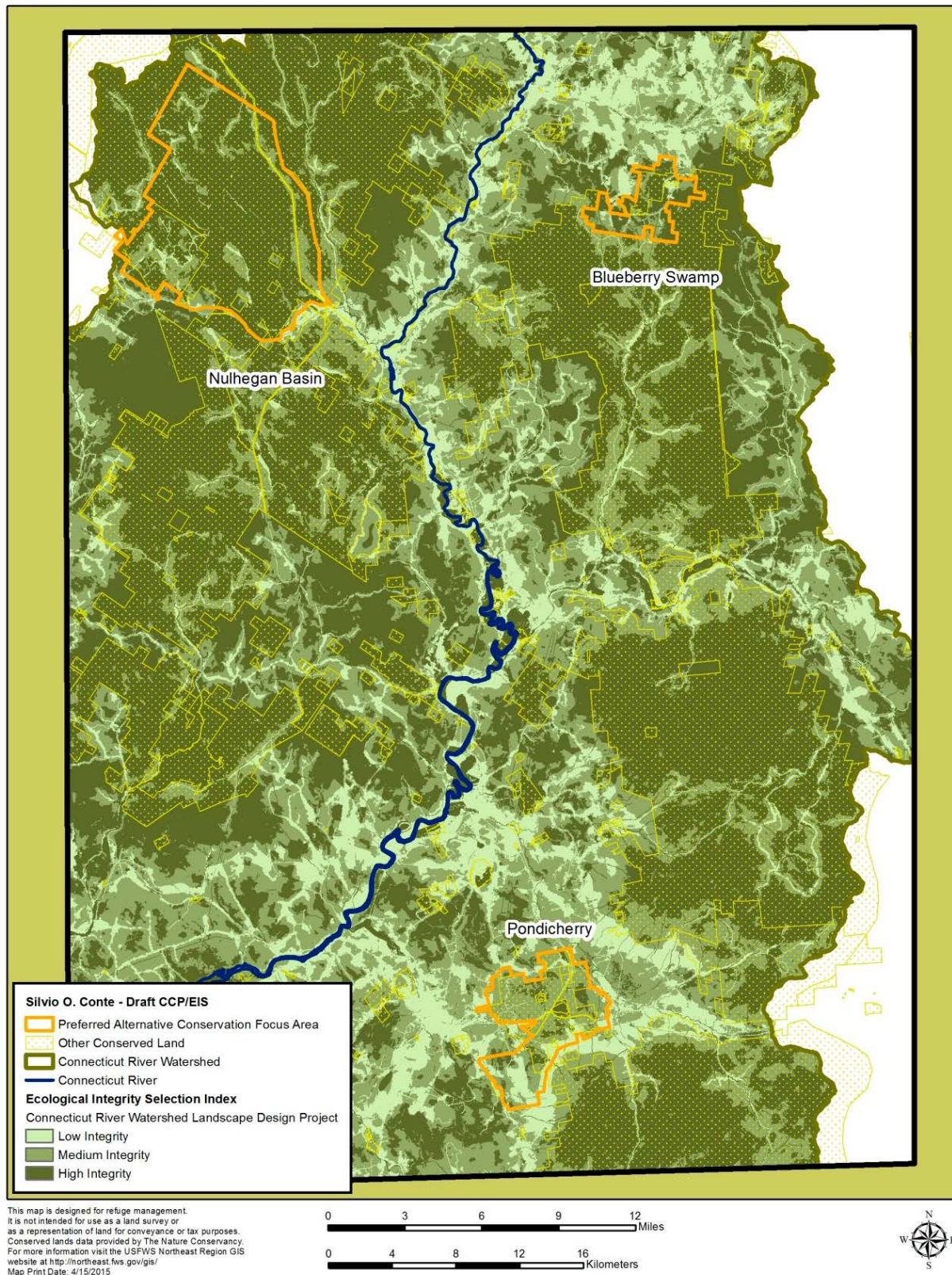
Map CIII.2. Example of How the Blueberry Swamp, Nulhegan Basin, and Pondicherry CFAs Overlap with the Connecticut River Watershed LCD Project's Ecological Integrity Selection Index Product.



U.S. Fish & Wildlife Service

Ecological Integrity Selection Index

Silvio O. Conte National Fish and Wildlife Refuge



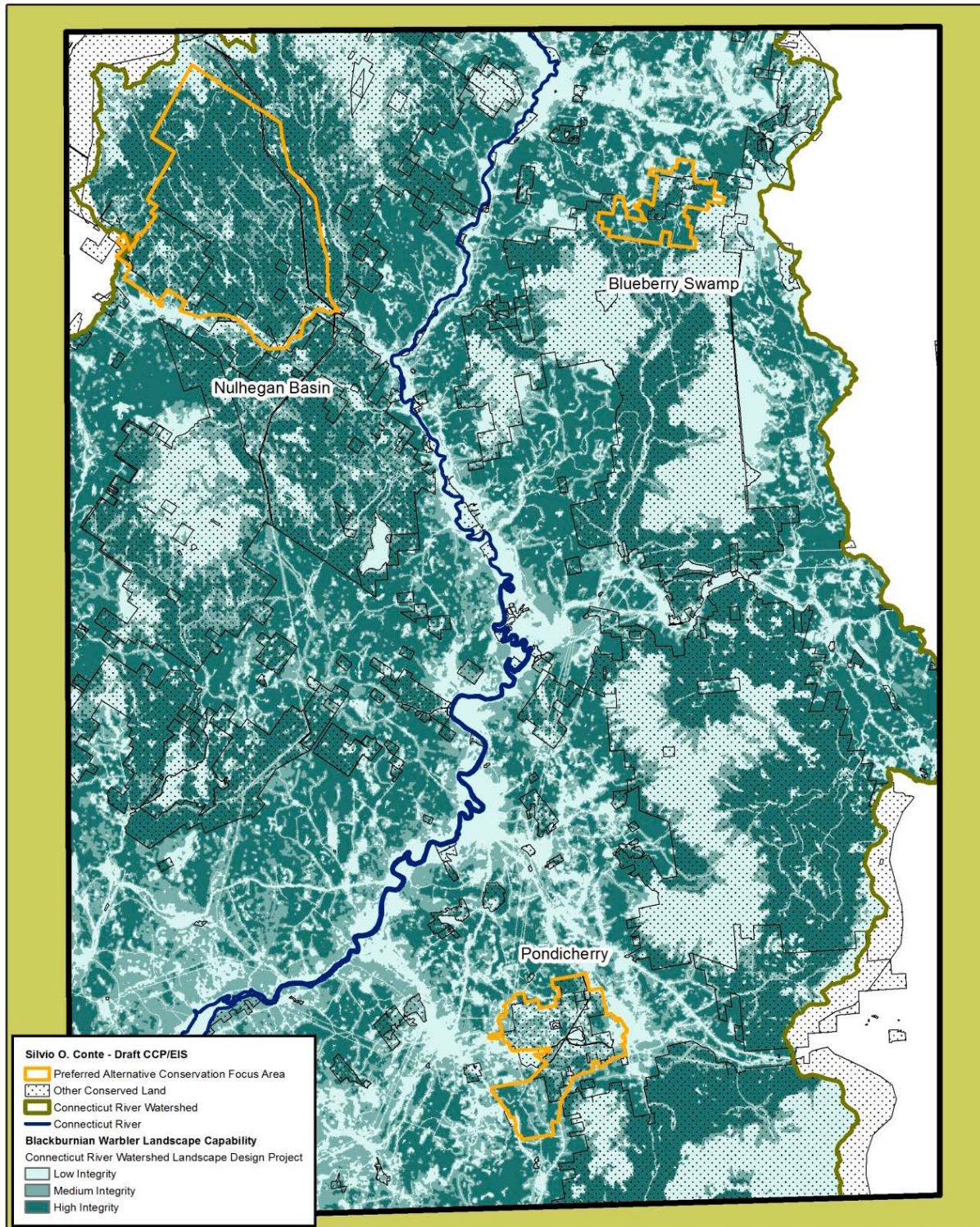
Map CIII.3. Example of How the Blueberry Swamp, Nulhegan Basin, and Pondicherry CFAs Overlap with the Connecticut River Watershed LCD Project's Blackburnian Warbler Landscape Capability Index Product.



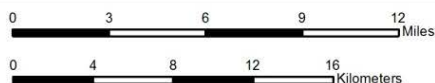
U.S. Fish & Wildlife Service

Blackburnian Warbler Landscape Capability

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed for refuge management. It is not intended for use as a land survey or as a representation of land for conveyance or tax purposes. Conserved lands data provided by The Nature Conservancy. For more information visit the USFWS Northeast Region GIS website at <http://northeast.fws.gov/gis/>. Map Print Date: 4/15/2015



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